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19871215 ;

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Equivalents: DE3837385, US4928302 ;

ABSTRACT:

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63224951	08.09.1988	
63233995	19.09.1988	

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H4K KBNJ

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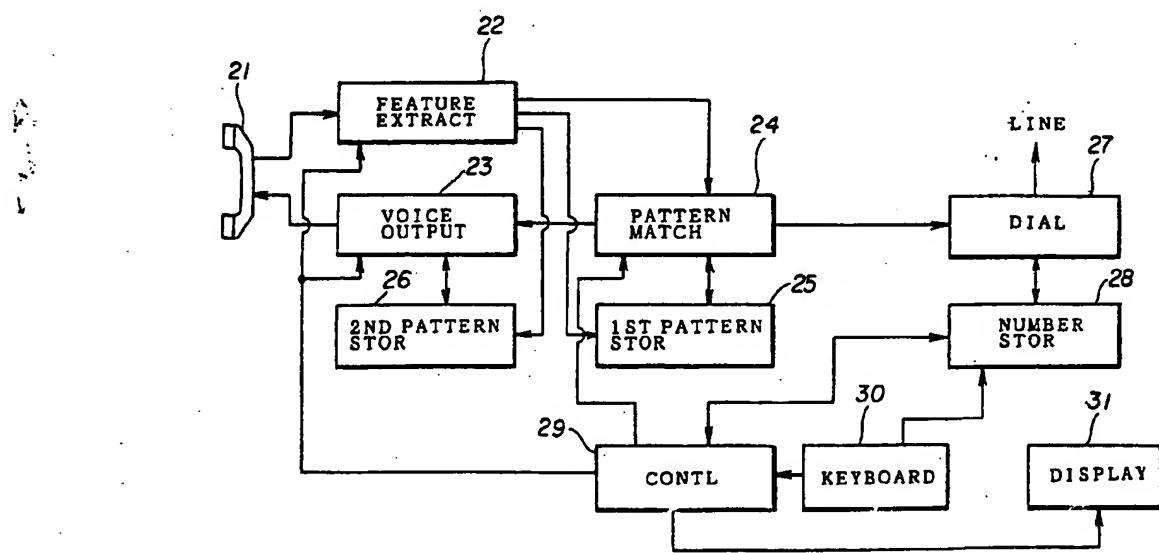
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(54) Voice actuated dialing apparatus

(57) A voice actuated dialing apparatus has a feature extraction part 22 for extracting an input speech pattern, a storage 25, 26, 28 for storing registered standard patterns and corresponding telephone numbers of destination subscribers, a pattern matching part 24 for comparing an input speech (a standard) pattern with the registered standard patterns so as to recognize a predetermined one of the registered standard patterns which matches the input speech pattern, a speech synthesis part 23 for outputting a speech corresponding to the predetermined standard pattern read out from the storage for confirmation of a result of the recognition, and a dialing circuit 27 for dialing to a predetermined one of the registered telephone numbers corresponding to the predetermined standard pattern in a voice-dialing mode.

FIG.2



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FIG. 12

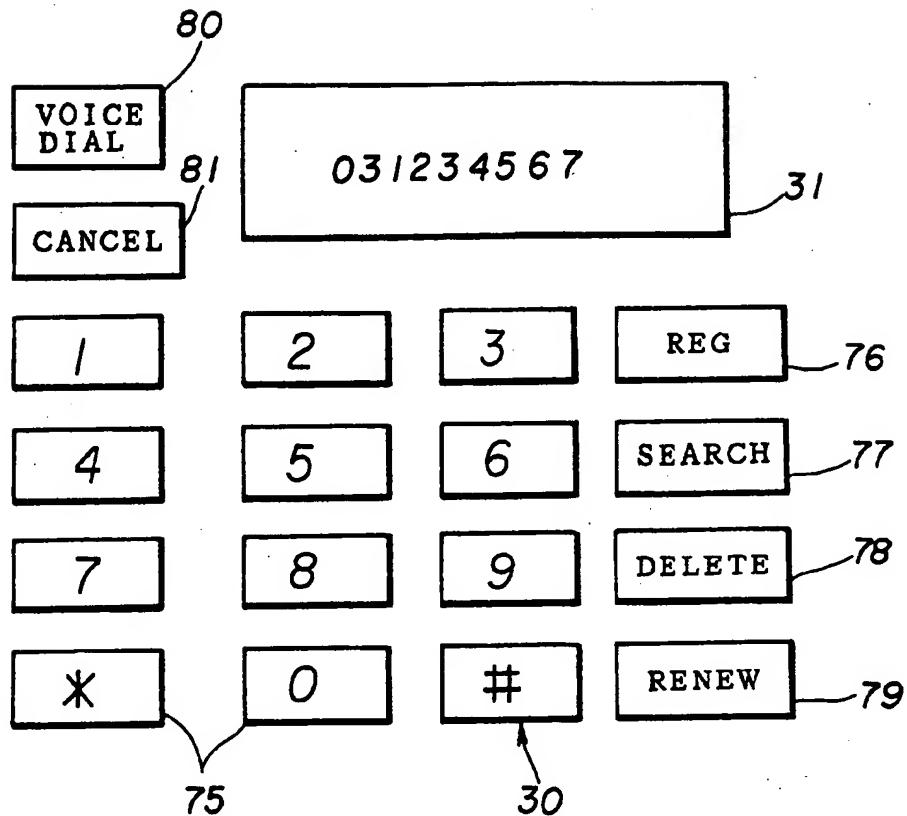


FIG. 1 (PRIOR ART)

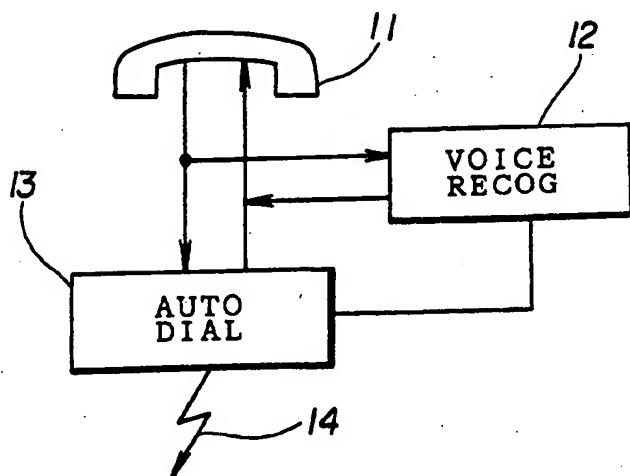
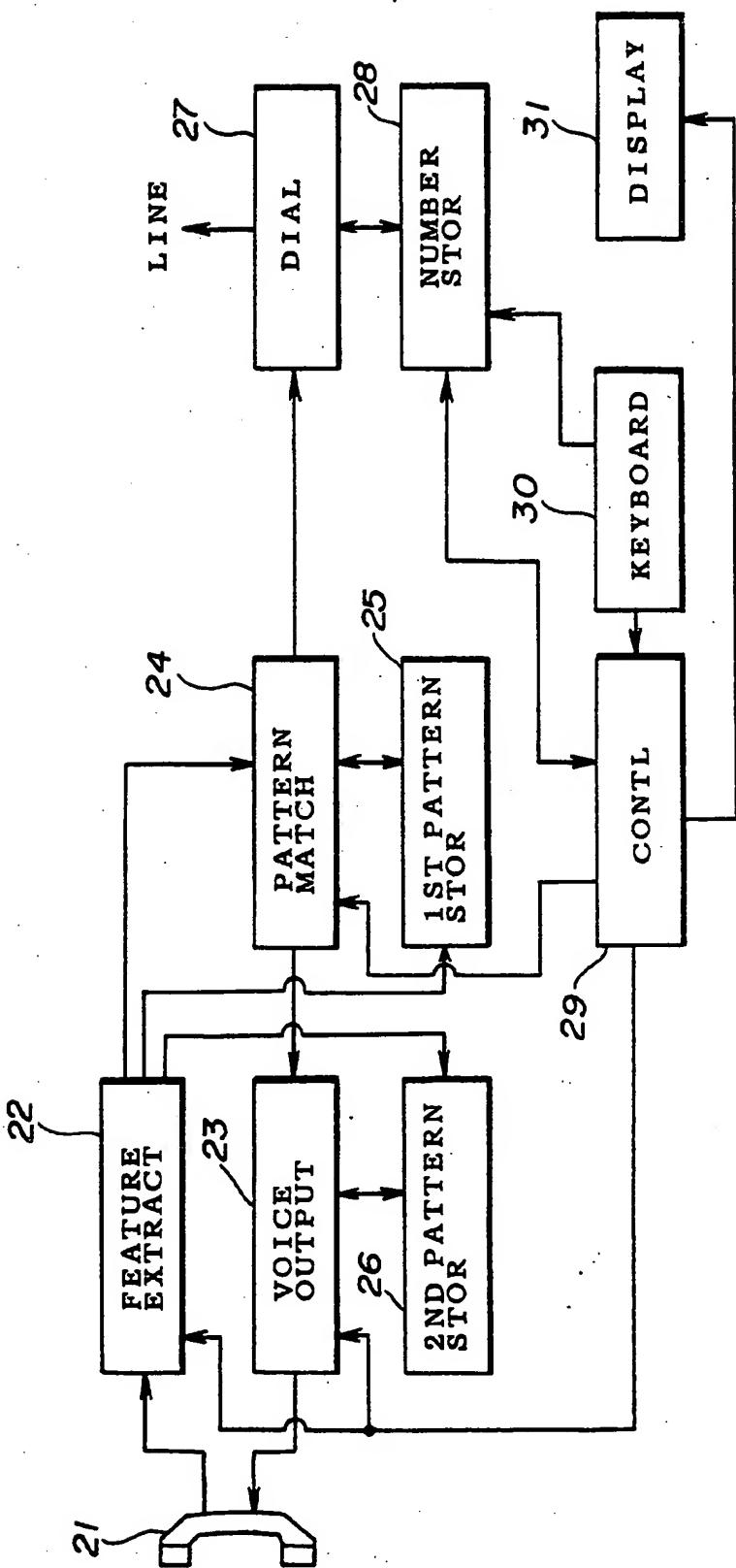


FIG.2

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FIG.3

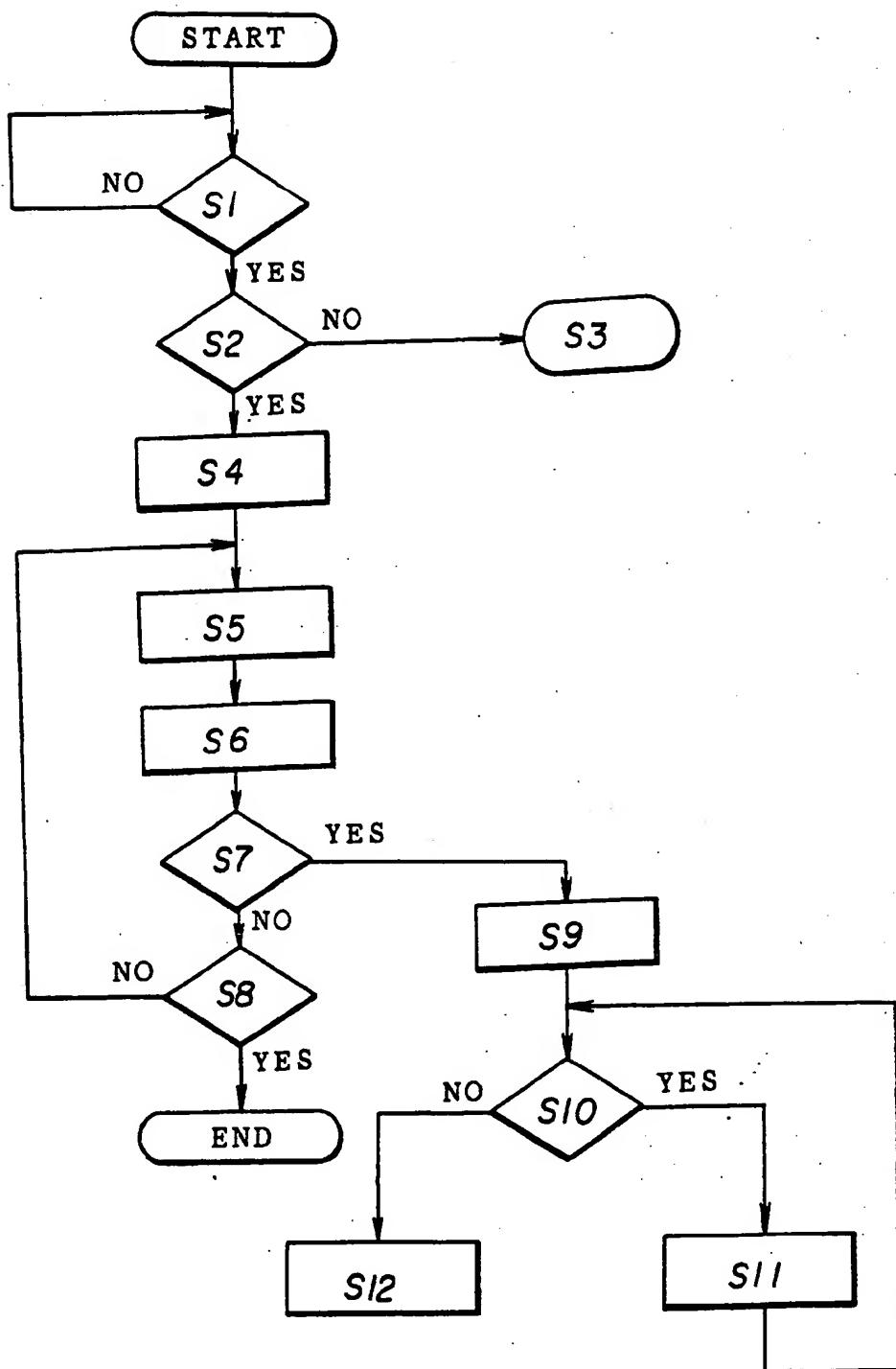
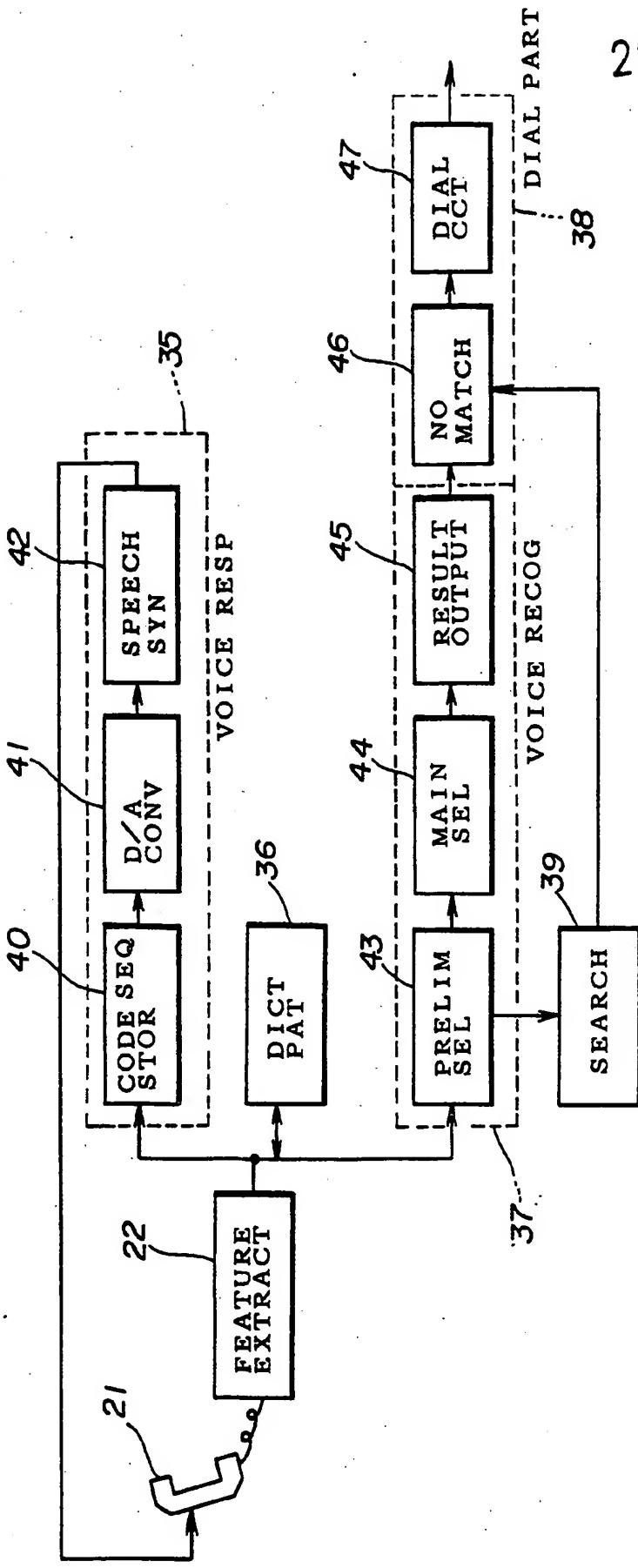


FIG.4

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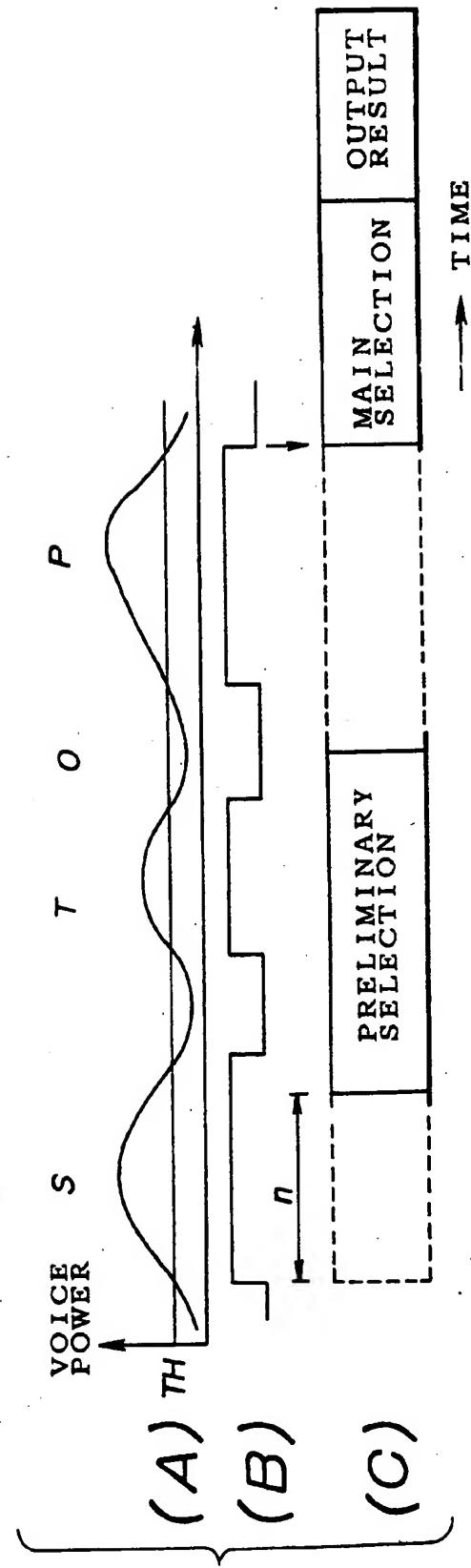
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FIG. 5



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FIG.6B

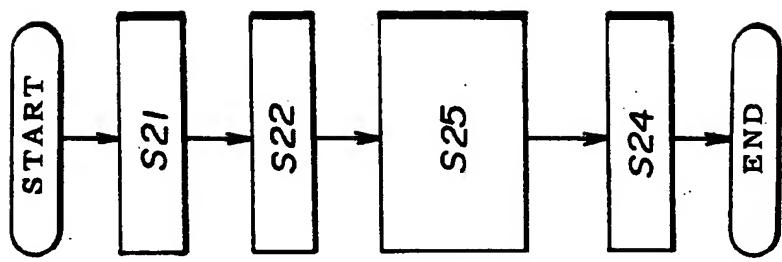
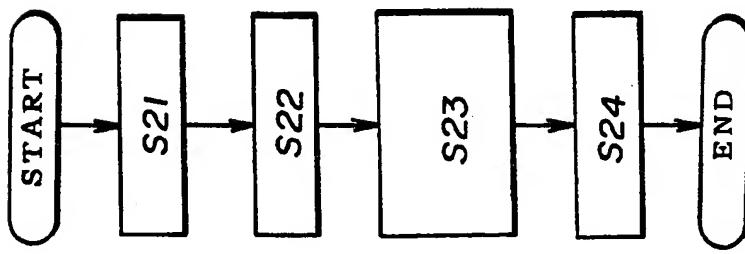
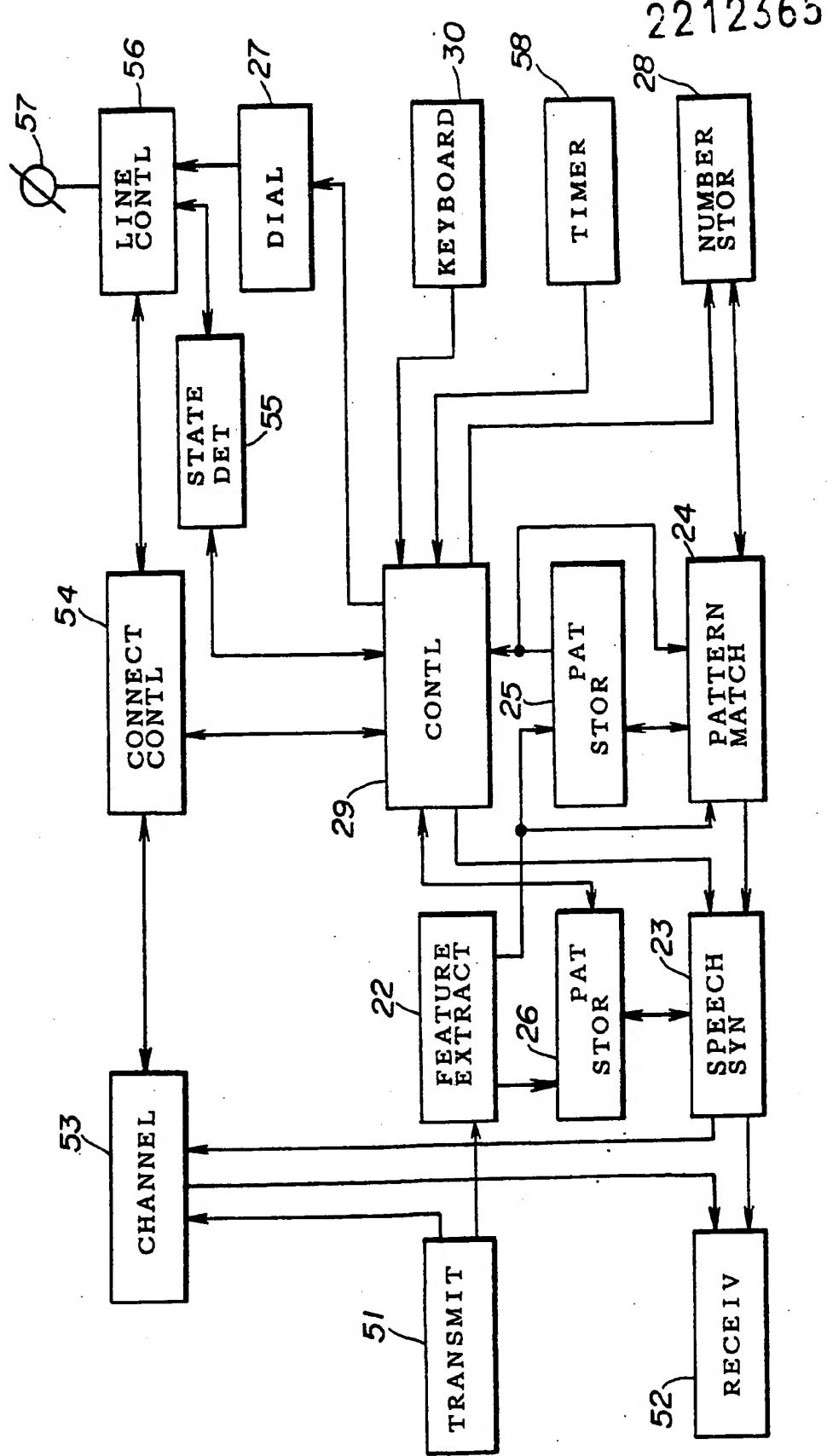


FIG.6A



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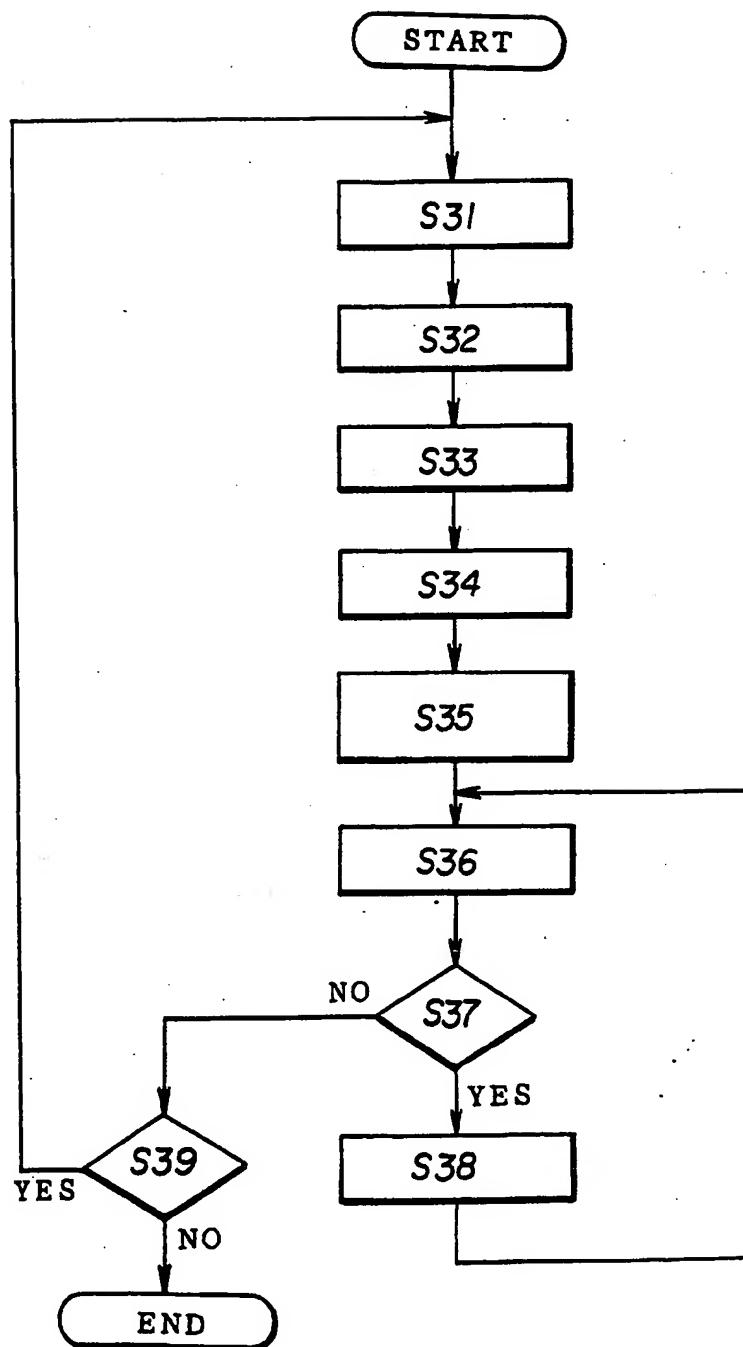
FIG. 7



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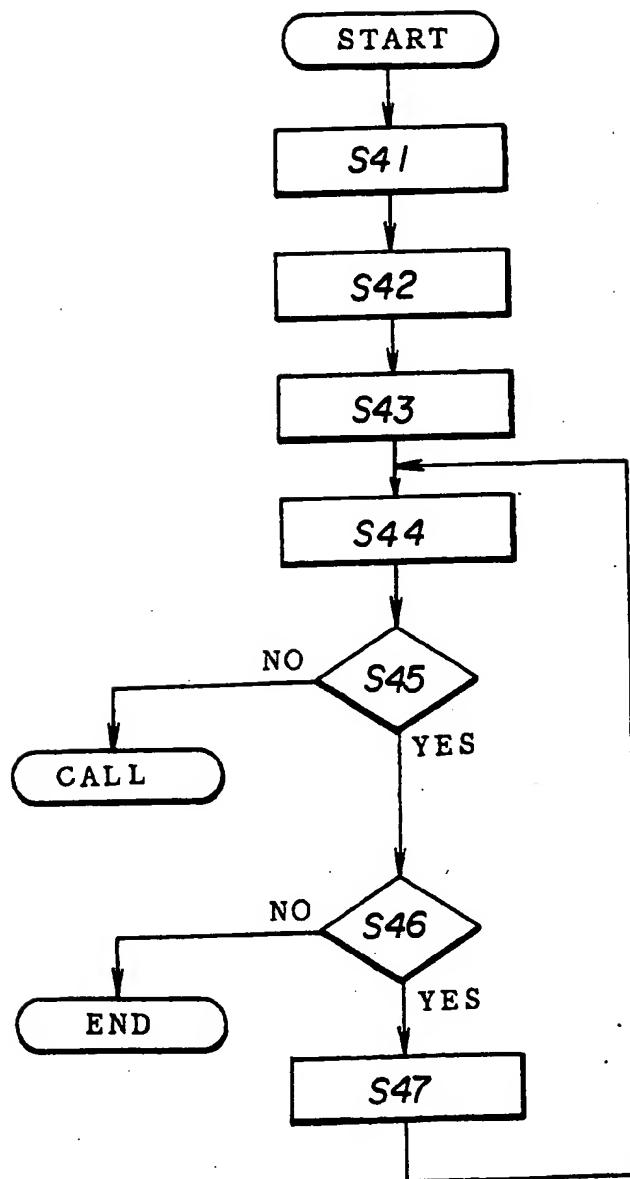
FIG.8



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FIG.9



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FIG. 10

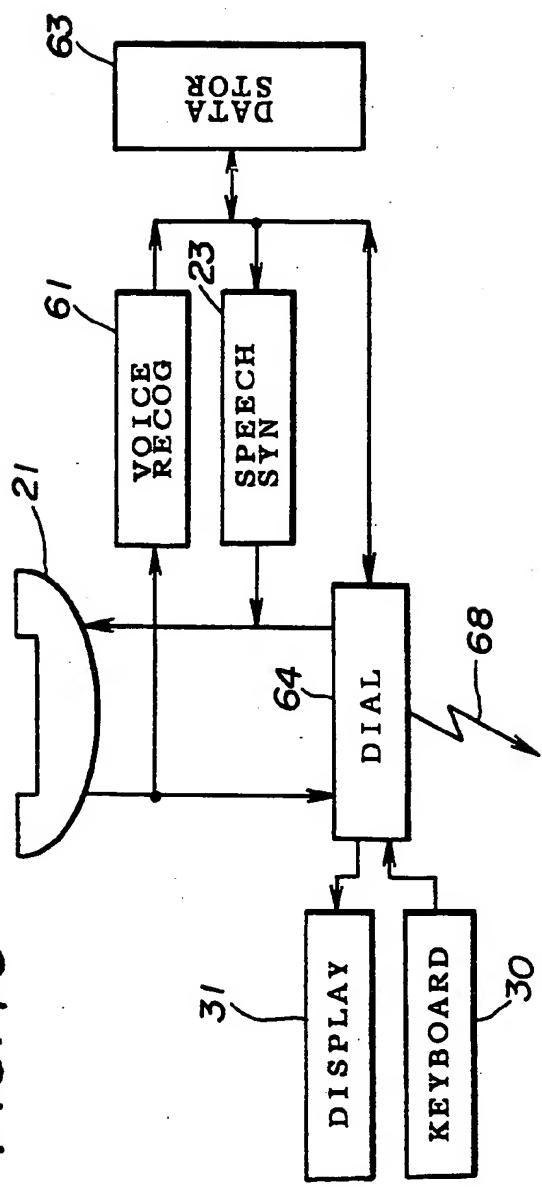
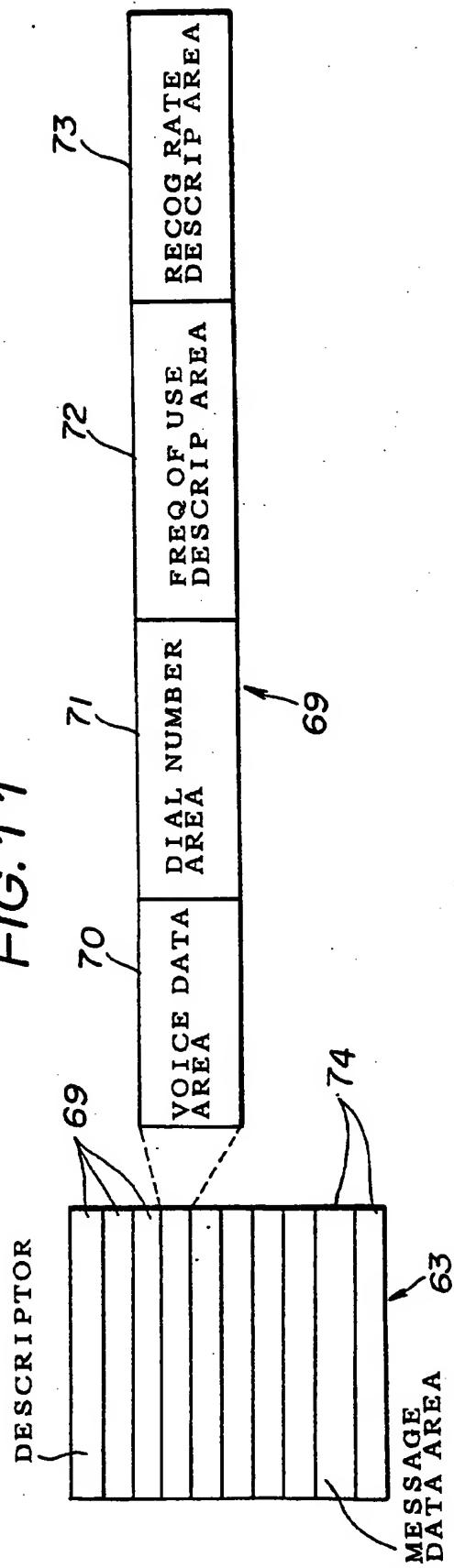


FIG. 11



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FIG.13

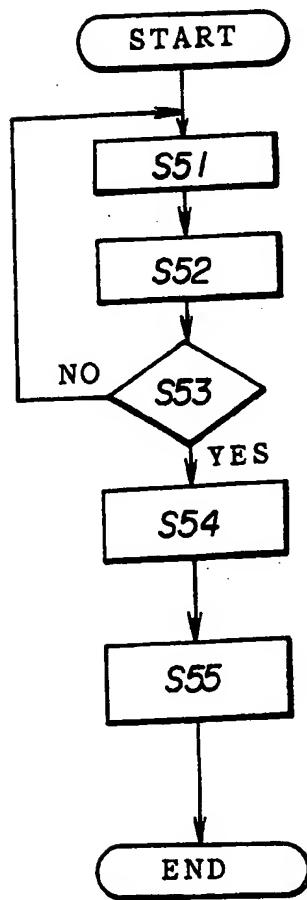


FIG.14

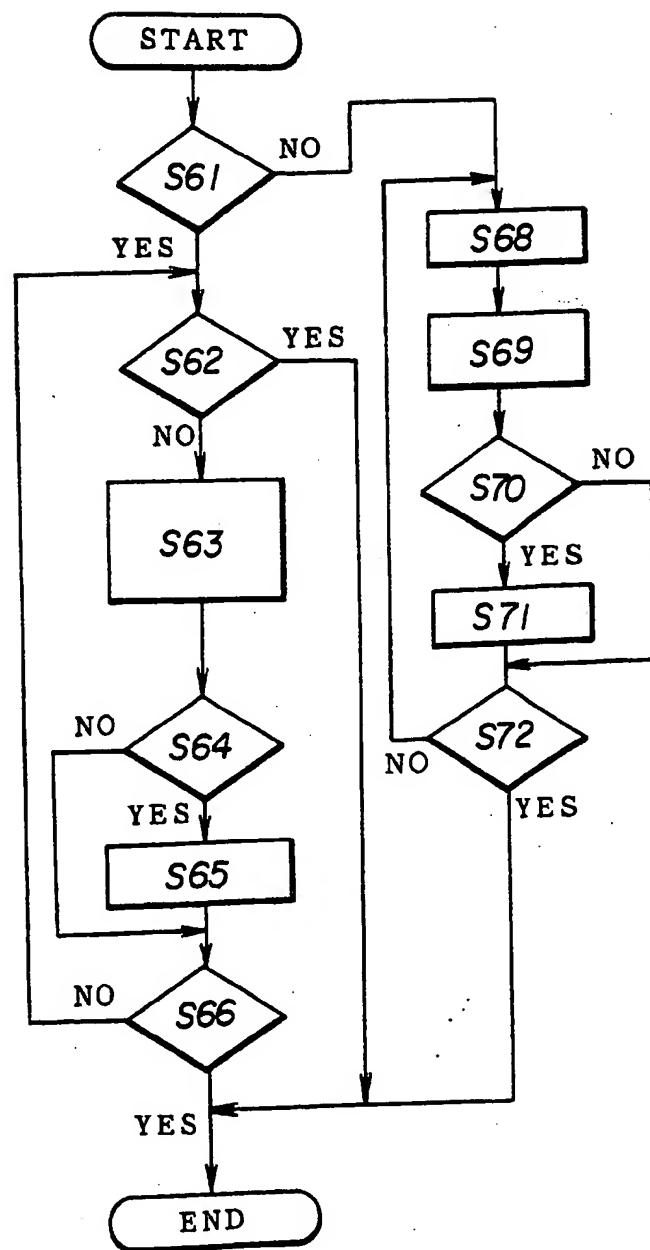
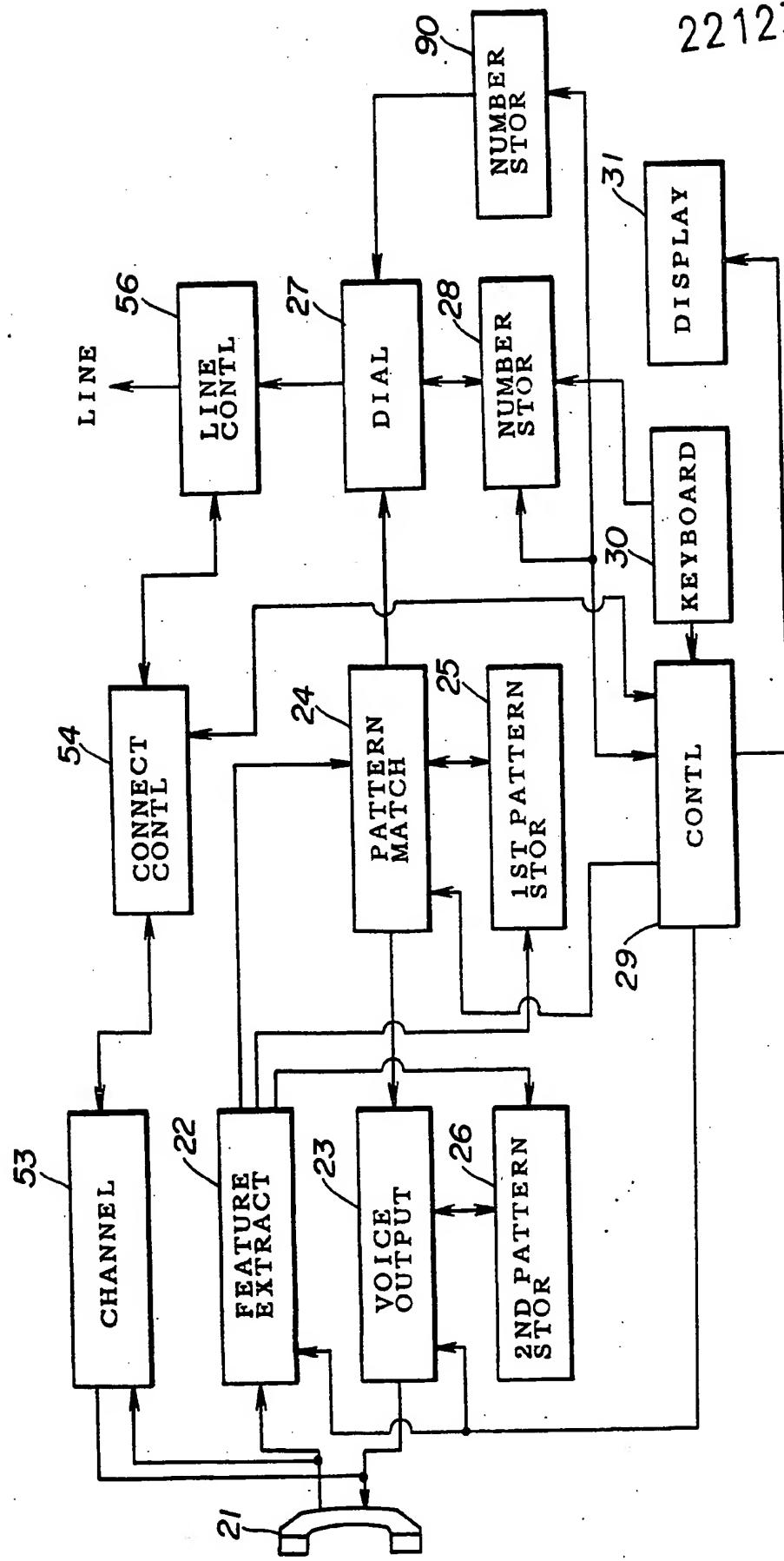


FIG. 15

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FIG. 16

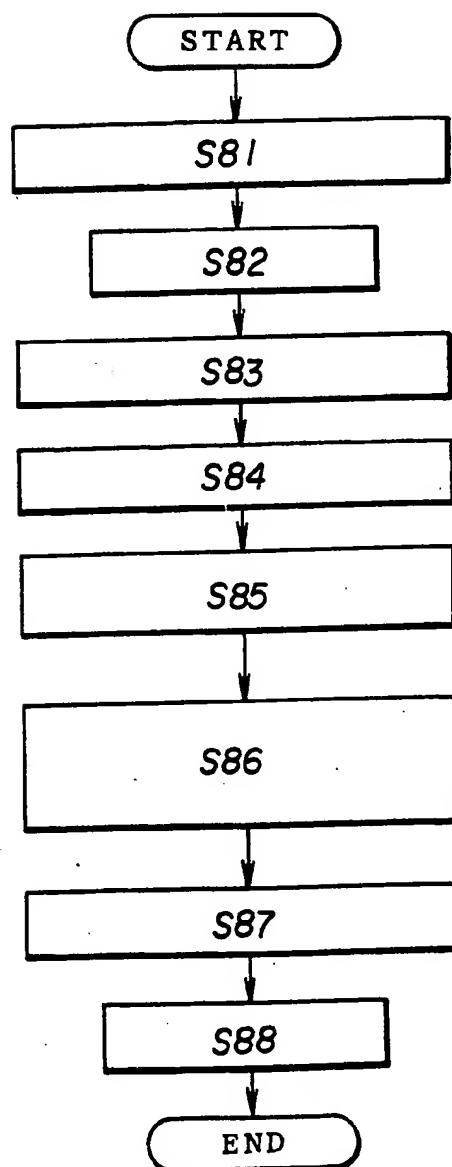
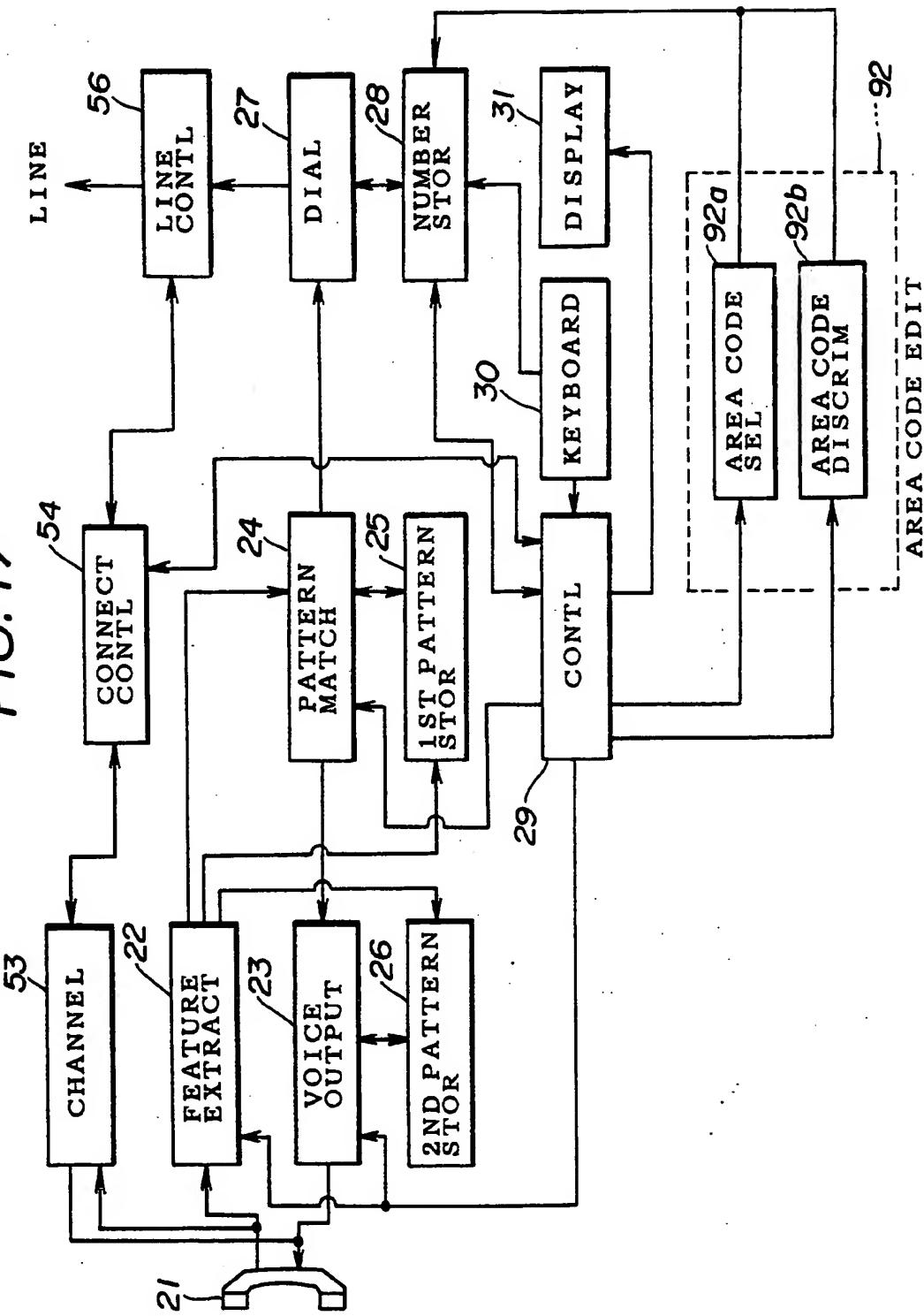


FIG. 17



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FIG. 18

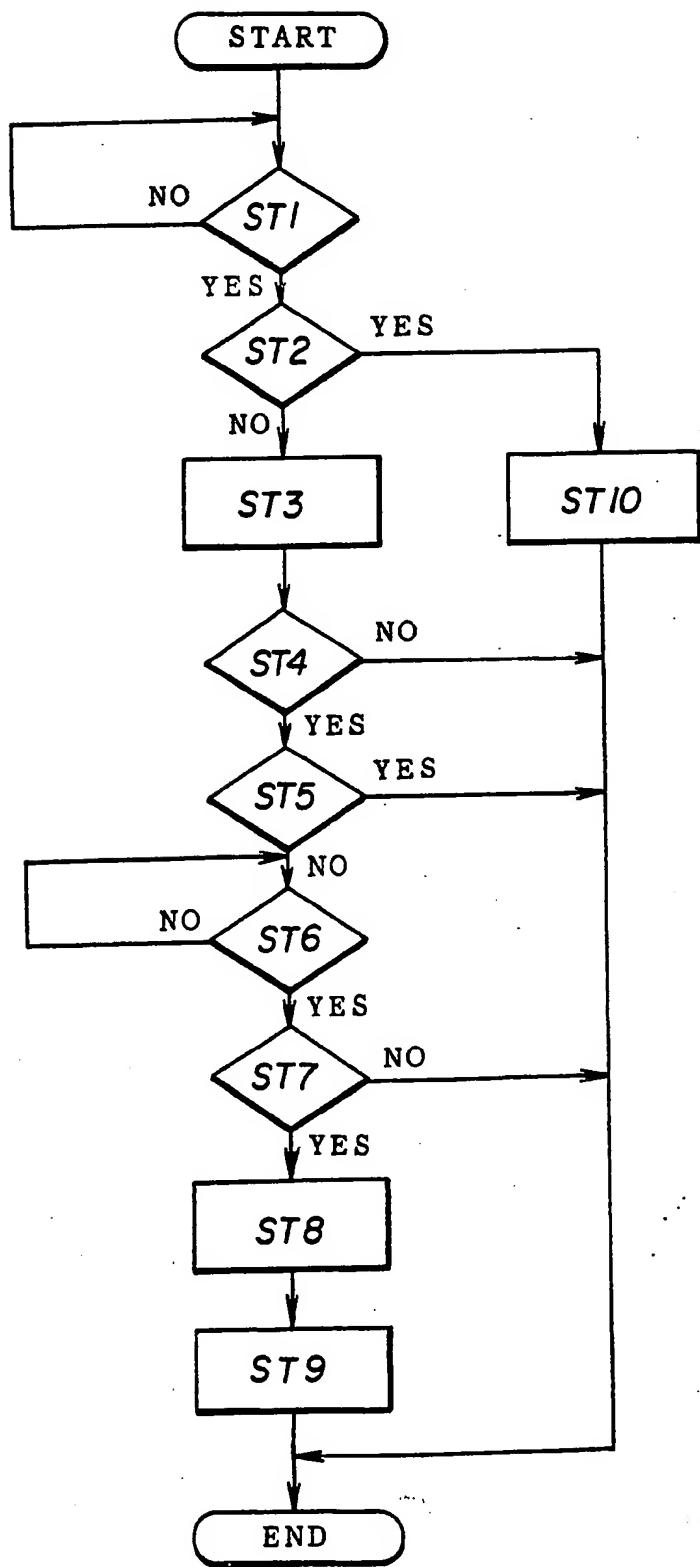


FIG. 19

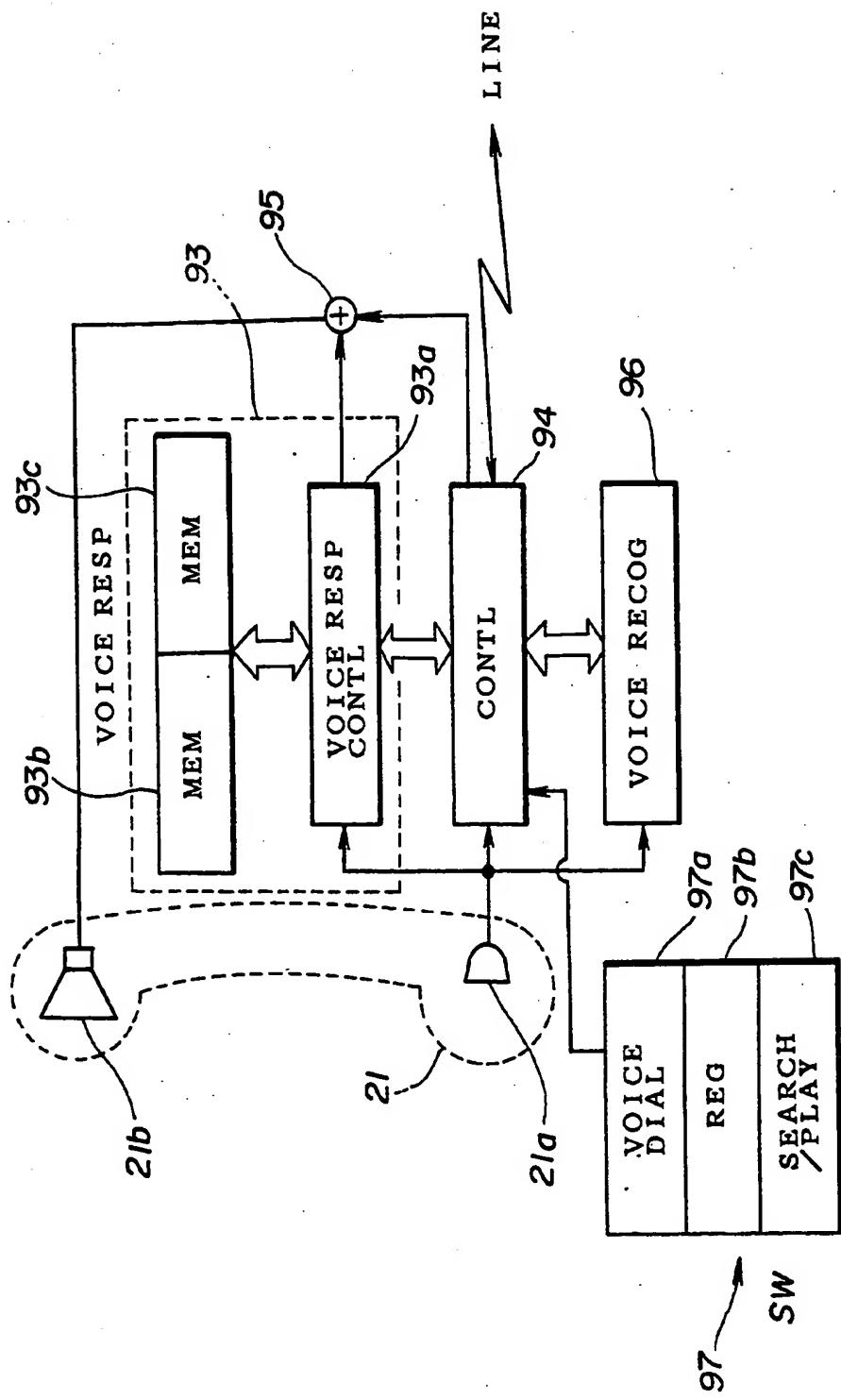
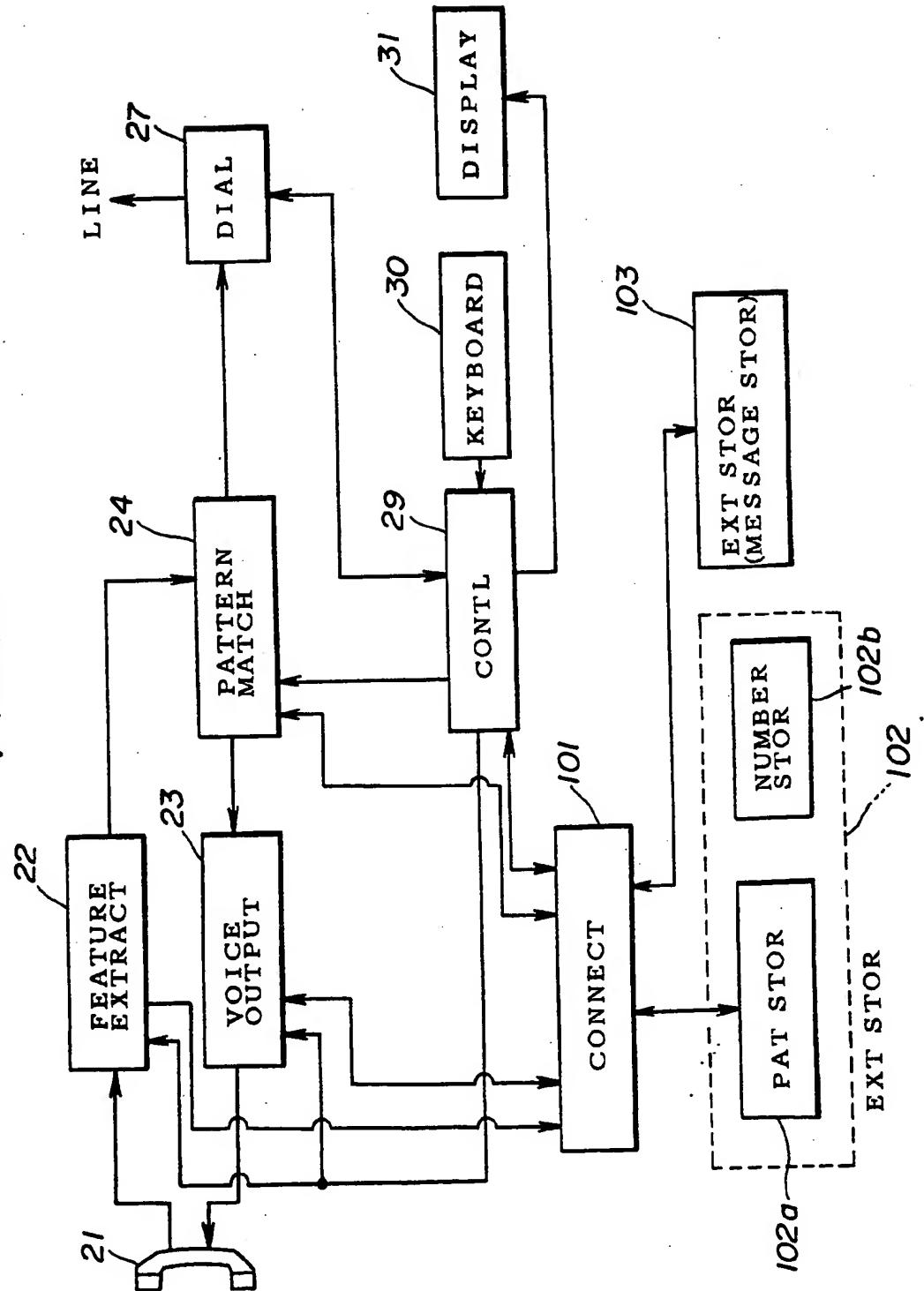


FIG. 20

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FIG.21

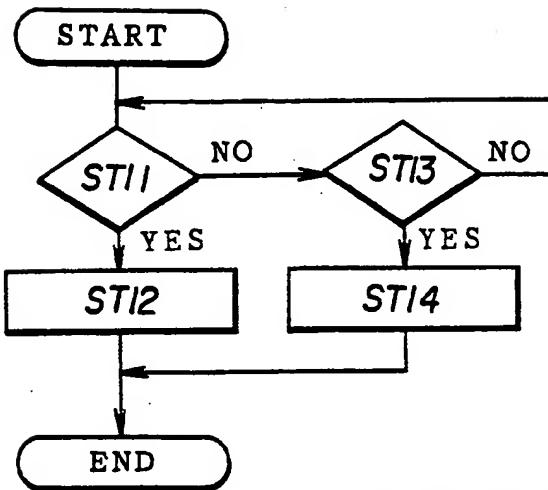


FIG.23

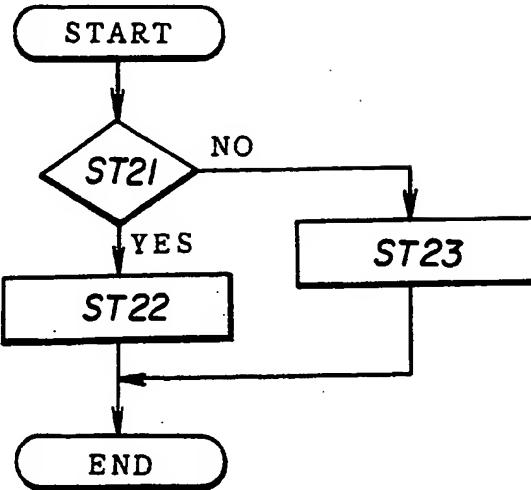


FIG.25

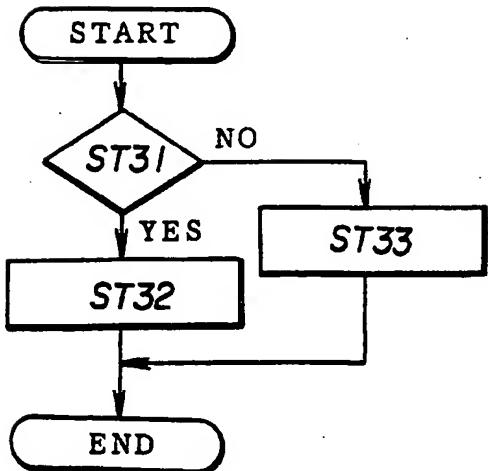


FIG. 22

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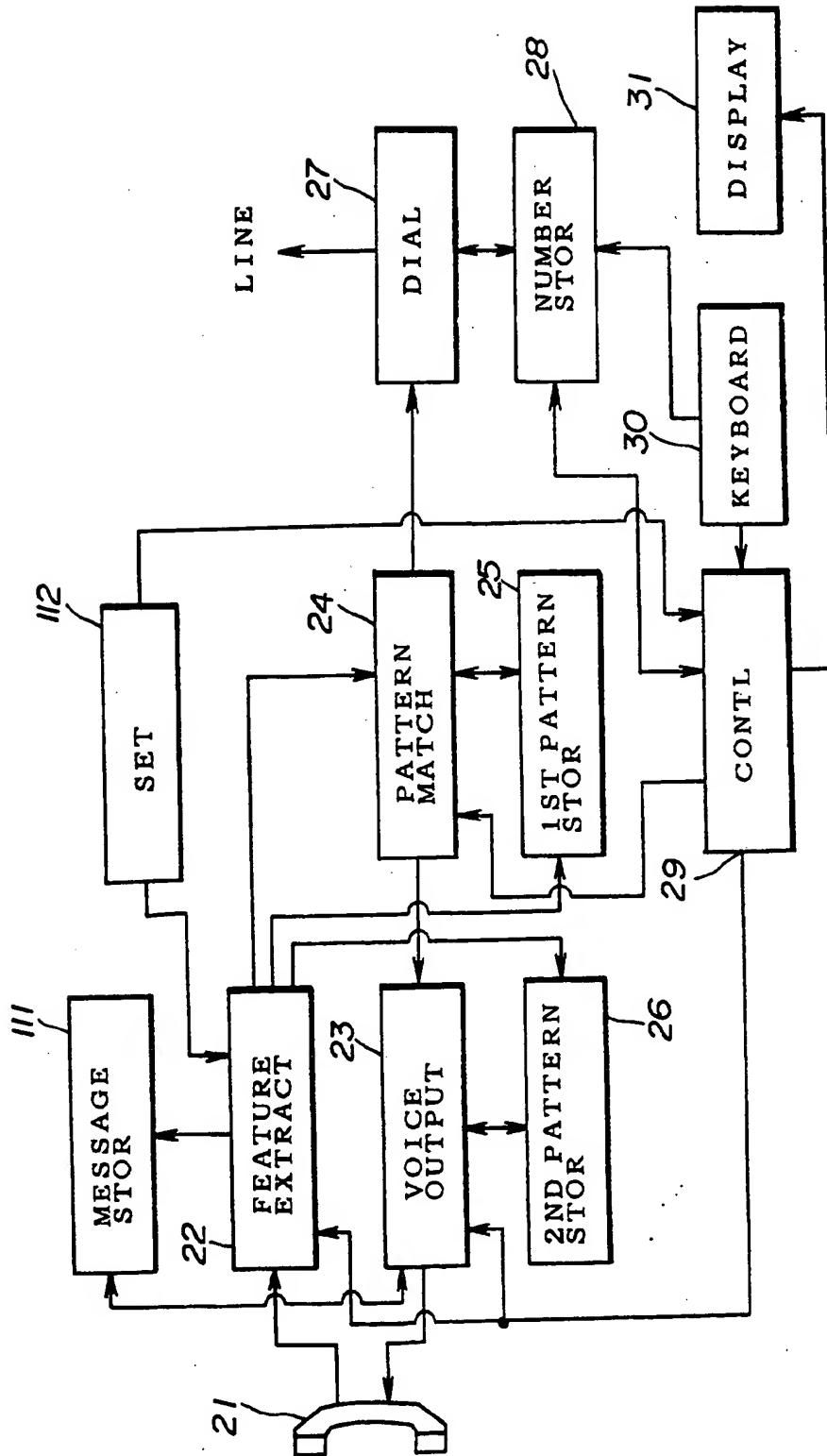


FIG.24

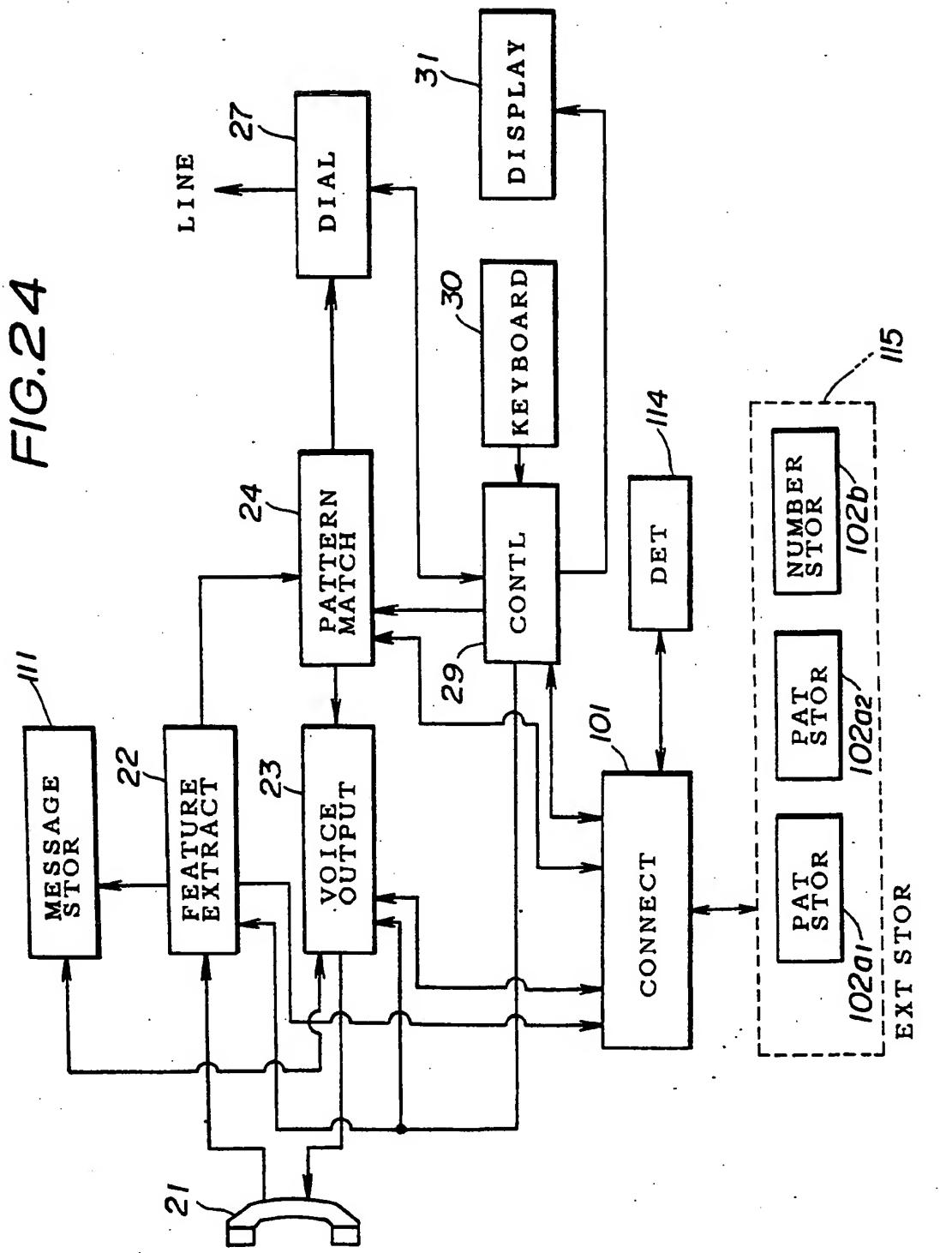
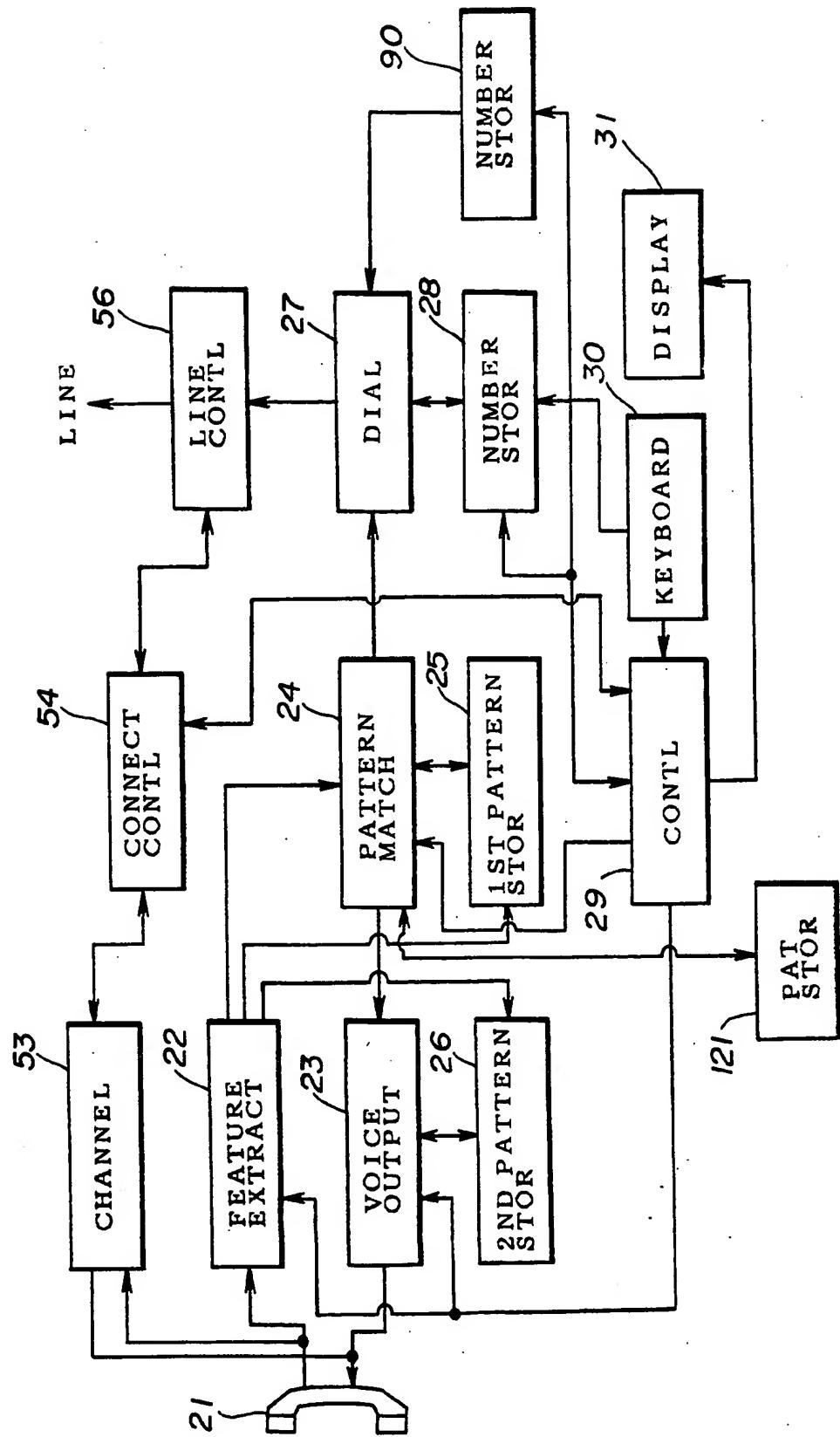


FIG.26



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FIG.27

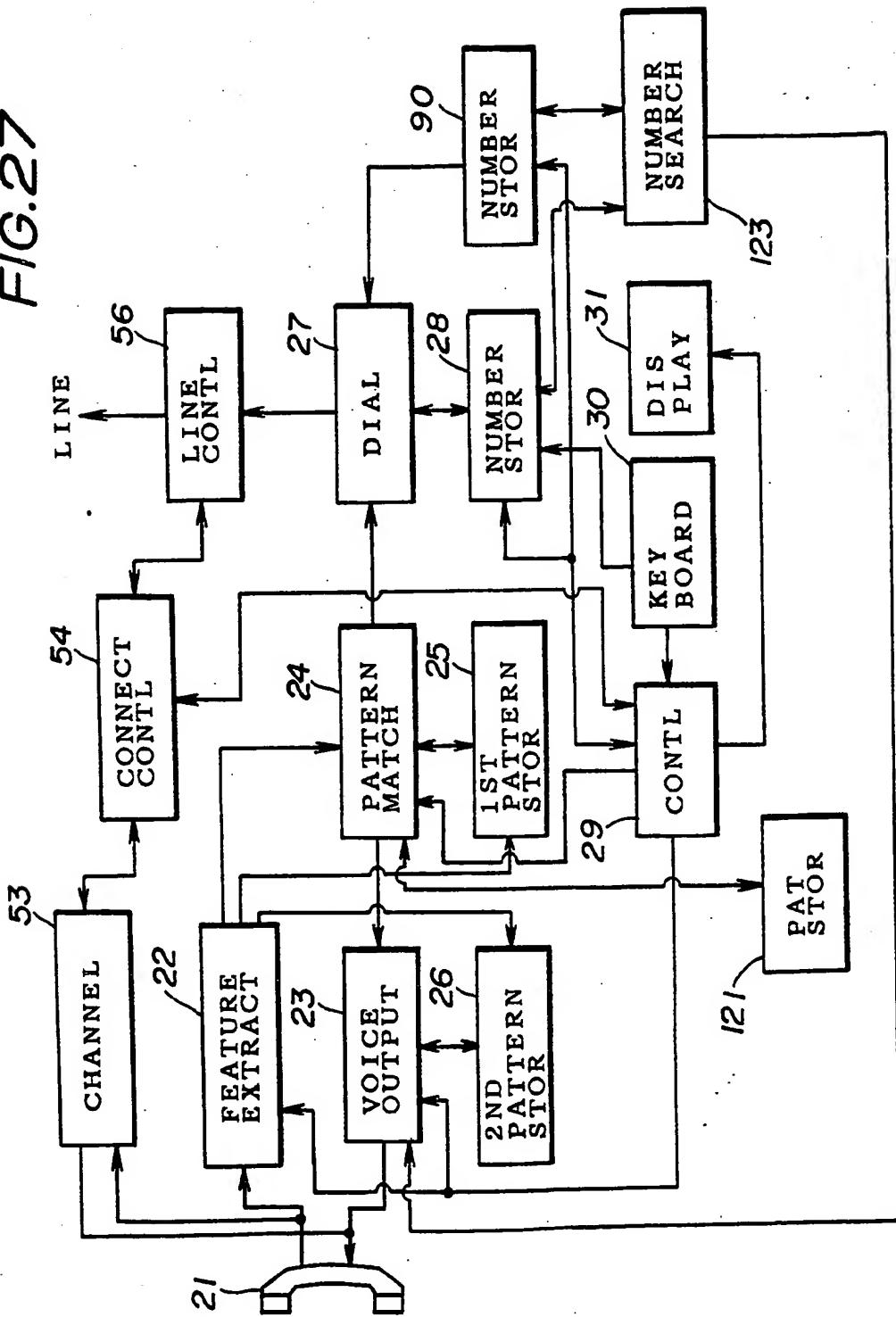
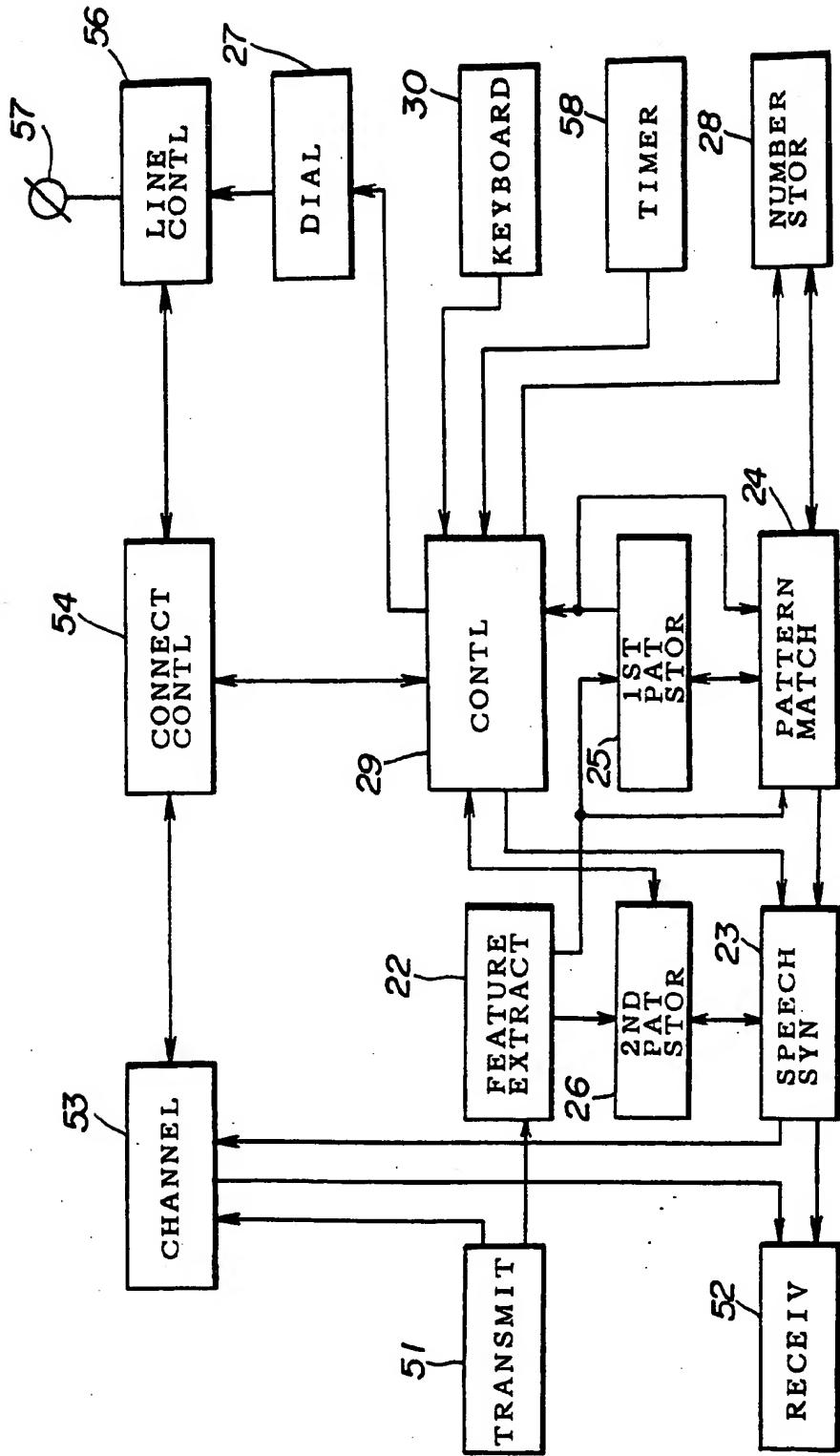


FIG.28

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"VOICE ACTUATED DIALING APPARATUS"

The present invention generally relates to voice actuated dialing apparatuses, and more particularly to a voice actuated dialing apparatus which recognizes a voice input and makes an automatic dialing to a registered destination telephone number which corresponds to the voice input.

In a conventional dialing apparatus of a telephone, there is a need to manually dial a telephone number of a destination subscriber when making a telephone call. Hence, a user must remember the telephone number of the destination subscriber or refer to a public or personal telephone directory, and there is a large burden on the user especially when the user frequently makes telephone calls to a large number of subscribers.

Accordingly, a voice actuated dialing apparatus (hereinafter simply referred to as a voice-dialing apparatus) was proposed in a Japanese Laid-Open Patent Application No.61-144157. According to this proposed apparatus, the user registers in advance standard patterns for voice recognition and response and corresponding telephone numbers. When making a telephone call, the user speaks a standard

1 pattern (key word) such as a name of the destination
subscriber he wishes to call instead of manually
dialing the telephone number of the destination
subscriber. Then, the apparatus recognizes the
5 standard pattern and automatically dials one of the
registered telephone numbers corresponding to the
recognized destination subscriber. As a result,
there is no need for the user to remember telephone
numbers and the user can make a telephone call
10 without referring to the telephone directory.

However, when a large number of telephone
numbers are registered, the user may forget the
standard patterns for retrieving each of the
registered telephone numbers. Furthermore, when the
15 user's voice changes due to catching a cold or the
like, there are cases where it becomes impossible to
retrieve the desired telephone number because the
apparatus cannot recognize the standard pattern from
the changed voice. Hence, it is conceivable to
20 successively output the registered standard patterns
through speech synthesis and make the user designate
the desired standard pattern when it is outputted so
that the apparatus can automatically dial a telephone
number corresponding to the desired standard
25 pattern. But this conceivable method suffers a

1 problem in that the designation of the desired
standard pattern is both troublesome and time
consuming. In other words, the user may miss the
desired standard pattern when he is interrupted while
5 listening to the successive output of the registered
standard patterns, such as when someone talks to the
user. In addition, the user may erroneously
designate a standard pattern which is outputted prior
to the desired standard pattern. In these cases, the
10 user must again listen to the registered standard
patterns from the beginning so that he may correctly
designate the desired standard pattern.

On the other hand, the voice-dialing
apparatus is generally provided with a search
15 function so that the relationship of the registered
standard patterns and telephone numbers may be
outputted by speech synthesis and/or display. This
search function is used when the user forgets the
standard pattern for retrieving a telephone number
20 and also when the user forgets whether or not a
certain telephone number is already registered. But
the search is made by successively outputting the
registered standard patterns and telephone numbers by
speech synthesis and/or display, and in a worst case,
25 the search must be made to last registered standard

1 pattern and telephone number before the desired
standard pattern is found. As a result, there is a
problem in that the search takes a long time to carry
out. When a clustering is used for the search, it is
5 possible to restrict a search range by entering a
cluster number, but the user must remember which
standard patterns belong to each of the clusters.

On the other hand, in the conventional
voice-dialing apparatus, only one telephone number is
10 registered with respect to one registered standard
pattern. Hence, in the case where the destination
subscriber has a plurality of telephone numbers but
the line is busy when the telephone call is made
responsive to the standard pattern corresponding to a
15 first telephone number, the user must once hang up
manually and call again later using the same standard
pattern or make another call using another standard
pattern corresponding to a second telephone number.
Thus, when it is only possible to register one
20 telephone number with respect to one registered
standard pattern, it is both troublesome and time
consuming for the user to find a line which is not
busy, especially when the user wishes to use the
telephone call on urgent matters and when one or more
25 telephone numbers of the destination subscriber is in

1 use for a long period of time.

But the voice-dialing apparatus can only make the automatic dialing when the destination telephone number is already registered. Thus, the
5 user must register in advance the standard patterns for voice recognition and response and the corresponding telephone numbers. In other words, the user must manually dial a destination telephone number which is not registered, and when the user
10 thereafter wishes to register this telephone number after finishing the call, the user must register the telephone number from the keys and also register the corresponding standard pattern by his voice. The user may register the telephone number and the
15 corresponding standard pattern before calling that telephone number, but the user may be in a hurry and wish to make the call first. Therefore, when the user wishes to call the telephone number which is not registered and thereafter register that telephone
20 number, there is a burden on the user in that the user must dial the same telephone number twice, that is, once to make the call manually and once to register the telephone number.

In addition, when registering the standard
25 patterns for voice recognition and response and the

1 corresponding telephone numbers; an area code of the
telephone number for a first region is usually not
registered when the voice-dialing apparatus is used
in the first region. But when the voice-dialing
5 apparatus is moved to a second region having an area
code different from that of the first region, the
voice-dialing can no longer be made to the
destination subscriber in the first region because
the area code of the first region which must be
10 dialed before the destination telephone number is not
registered together with the destination telephone
number. Similarly, when the voice-dialing apparatus
is moved to the second region and the voice-dialing
is to be made to the destination subscriber in the
15 second region, the call cannot be made because the
area code of the second region which does not need to
be dialed when in the second region is registered
together with the destination telephone number
because the voice-dialing apparatus was originally
20 used in the first region. Therefore, when moving the
voice-dialing apparatus from the first region to the
second region with the different area code, the user
must re-register all of the telephone numbers in the
first and second regions so as to add or delete the
25 area codes where necessary.

1 There are answering phones which record on
a magnetic tape or the like a message from a caller
when the user is out, and play back the message at an
arbitrary time. However, there has not been proposed
5 an answering phone which has the voice-dialing
function. On the other hand, the voice recognition
rate of the voice-dialing apparatus is not 100%, and
it is necessary to output the result of the voice
recognition by a speech synthesis, for example, so
10 that the user can confirm the destination subscriber
before the call is actually made. Recently, there
are answering phones provided with a speech synthesis
apparatus which records and plays back the message in
a form of a digitally encoded audio signal which is
15 unaffected by a deterioration and the like of the
magnetic tape. Thus, when applying the voice-dialing
apparatus to such an answering phone, it is
conceivable to use a speech synthesis apparatus in
common for the confirmation of the result of the
20 voice recognition and for the play back of the
recorded message.

However, when a part for storing the
standard patterns and a part for storing the
telephone numbers are provided inside the telephone
25 set, the voice-dialing can only be made from the

1 telephone set to which the standard patterns and the
telephone numbers have been registered. In addition,
when a part for recording the message is provided
inside the answering phone, a total time for
5 recording the messages becomes fixed and it is
difficult to cope with the user's needs. In
addition, a hardware is required exclusively for
setting the telephone set to an answering mode.
Furthermore, it is difficult to maintain the
10 telephone set compact when the part for storage is
provided inside the telephone set.

Moreover, when the voice-dialing apparatus
is applied to the answering phone provided with the
speech synthesis apparatus, it is a waste that one
15 speech synthesis apparatus must be provided for the
speech recognition and another speech synthesis
apparatus must be provided for the answering phone.
Further, the answering phone must be manually set to
the answering mode by the user when the user goes
20 out, and the functions of the answering phone are not
carried out when the user forgets to set the
answering phone to the answering mode.

As described before, the line may be busy
when the dialing is made. In this case, it is
25 possible to make the voice-dialing later when the

1 destination telephone number is already registered.
But it is necessary to manually dial the same
telephone number again when this telephone number is
not registered. There are ordinary telephones
5 provided with a re-dialing function, wherein a
re-dialing is made to a last dialed telephone number
responsive to a manipulation of a re-dial button.
However, there are problems in that the telephone set
must be provided with the re-dial button exclusively
10 for instructing the re-dial operation and the user
must still push the re-dial button in order to make
the call. In addition, when the user forgets the
last dialed telephone number, the user may
erroneously re-dial to a wrong telephone number
15 because there is no means for the user to confirm the
last dialed telephone number.

Furthermore, as described before, the voice
recognition rate of the voice-dialing apparatus is
not 100%, and it is necessary to output the result of
20 the voice recognition by a speech synthesis, for
example, so that the user can confirm the destination
subscriber before the call is actually made. The
user may confirm the result of the voice recognition
by voice or by pushing a confirm button, for
25 example. Therefore, there is considerable burden on

1 the user in that the user must confirm the
destination subscriber with every call made by the
voice-dialing.

Next, a description will be given on an
5 example of a conventional voice-dialing apparatus by
referring to FIG.1 so as to explain some of the
problems referred above. The voice-dialing apparatus
generally has a handset 11, a voice recognition part
12 coupled to the handset 11, and an automatic
10 dialing part 13 for controlling a coupling between
the handset 11 and a subscriber line 14. When the
user enters by voice a name or a word corresponding
to a standard pattern (that is, a key word) of a
destination subscriber through the handset 11, the
15 voice recognition part 12 recognizes the standard
pattern and selects one of registered telephone
numbers corresponding to the recognized standard
pattern. The automatic dialing part 13 makes the
automatic dialing to the registered telephone number
20 selected by the voice recognition part 12.

In this conventional voice-dialing
apparatus, a number of telephone numbers which may be
registered is limited. When the telephone numbers
are already registered to the full capacity and some
25 new telephone numbers need to be registered, it is

1 necessary to delete a number of registered telephone
numbers corresponding to the number of new telephone
numbers to be registered. In this case, it is useful
to utilize the search function so as to check all of
5 the registered telephone numbers and select those
telephone numbers which are unlikely to be used
frequently in the future. However, contrary to the
user's impression, some of the selected telephone
numbers may actually be used frequently, and thus the
10 user may erroneously delete the telephone numbers
which are frequently used.

In addition, it is impossible to set the
voice recognition rate to 100%. In addition, the
user's voice may change with time, and for this
15 reason, the recognition rate tends to gradually
deteriorate with time. Accordingly, in actual
practice, the voice data which is already registered
is renewed or re-registered in order to cope with
such deterioration in the voice recognition rate.

20 However, it is impossible for the user to
determine which registered standard pattern has a
poor recognition rate. Therefore, there is a problem
in that it is extremely difficult for the user to
accurately renew or re-register the voice data which
25 actually needs to be renewed or re-registered.

1 On the other hand, when registering the
destination subscribers, the user first enters the
telephone number of the destination subscriber from
the keys and then enters the standard pattern for
5 identifying the destination subscriber by voice. The
entries by the keys and voice may be made in
conformance with a guidance (voice or display)
provided by the voice-dialing apparatus.. But when a
large number of destination subscribers are
10 registered at one time, it takes a considerable time
to complete the registration. On the other hand,
when the registration is carried out in small
numbers, it is difficult for the user to keep track
of which destination subscribers have been registered
15 and which destination subscribers need to be
registered.

Accordingly, it is a general object of the
present invention to provide a novel and useful
voice-dialing apparatus in which the problems
20 described above are eliminated.

According to one aspect of the present
invention, there is provided a voice actuated dialing
apparatus comprising input/output means for inputting
and outputting data, feature extraction means for
25 extracting a feature of an input data received

1 through said input/output means; storage means for
storing standard patterns and corresponding telephone
numbers of destination subscribers as registered
data, pattern matching means for comparing a standard
5 pattern of the feature extracted by said feature
extraction means with the standard patterns stored in
said storage means so as to recognize a predetermined
one of the stored standard patterns which matches the
standard pattern of the extracted feature, speech
10 synthesis means for outputting through said
input/output means a speech corresponding to said
predetermined stored standard pattern read out from
said storage means so as to confirm a result of the
recognition made in said pattern matching means,
15 dialing means for dialing to a predetermined one of
the telephone numbers stored in said storage part and
corresponding to said predetermined standard pattern
in a voice-dialing mode, and control means for
controlling operation sequences of said feature
20 extraction means, said storage means, said pattern
matching means, said speech synthesis means and said
dialing means, said control means successively
outputting to said input/output means at least a part
of the registered data stored in said storage means
25 in response to a search instruction received from

1 said input/output means designating the part to be
successively outputted.

According to another aspect of the present invention, there is provided a voice actuated dialing apparatus comprising input/output means for inputting and outputting data, feature extraction means for extracting a feature of an input data received through said input/output means, storage means for storing standard patterns and corresponding telephone numbers of destination subscribers as registered data, said storage means storing a plurality of telephone numbers with respect to predetermined ones of the subscribers, pattern matching means for comparing a standard pattern of the feature extracted by said feature extraction means with the standard patterns stored in said storage means so as to recognize a predetermined one of the stored standard patterns which matches the standard pattern of the extracted feature, speech synthesis means for outputting through said input/output means a speech corresponding to said predetermined stored standard pattern read out from said storage means so as to confirm a result of the recognition made in said pattern matching means, dialing means for dialing to a predetermined one of the telephone numbers stored

1 in said storage part and corresponding to said
predetermined standard pattern in a voice-dialing
mode, and control means for controlling operation
sequences of said feature extraction means, said
5 storage means, said pattern matching means, said
speech synthesis means and said dialing means, said
control means controlling said dialing means to
automatically dial another telephone number which
corresponds to said predetermined standard pattern in
10 a voice-dialing mode when a line of a first dialed
telephone number is busy and a plurality of telephone
numbers are stored with respect to said predetermined
standard pattern.

According to another aspect of the present
15 invention, there is provided a voice actuated dialing
apparatus comprising input/output means for inputting
and outputting data, feature extraction means for
extracting a feature of an input data received
through said input/output means, storage means for
20 storing standard patterns and corresponding telephone
numbers of destination subscribers as registered data
and for storing a last dialed telephone number,
pattern matching means for comparing a standard
pattern of the feature extracted by said feature
extraction means with the standard patterns stored in
25

1 said storage means so as to recognize a predetermined
one of the stored standard patterns which matches the
standard pattern of the extracted feature, speech
synthesis means for outputting through said
5 input/output means a speech corresponding to said
predetermined stored standard pattern read out from
said storage means so as to confirm a result of the
recognition made in said pattern matching means,
dialing means for dialing to a predetermined one of
10 the telephone numbers stored in said storage part and
corresponding to said predetermined standard pattern
in a voice-dialing mode, and control means for
controlling operation sequences of said feature
extraction means, said storage means, said pattern
15 matching means, said speech synthesis means and said
dialing means, said control means controlling said
storage means to store said last dialed telephone
number in said storage means as registered data in
response to a register instruction received from said
input/output means, said register instruction
20 accompanying a standard pattern which corresponds to
said last dialed telephone number and is entered from
said input/output means through said feature
extraction means.

25 According to another aspect of the present

1 invention, there is provided a voice actuated dialing
apparatus comprising input/output means for inputting
and outputting data, feature extraction means for
extracting a feature of an input data received
5 through said input/output means, storage means for
storing standard patterns and corresponding telephone
numbers of destination subscribers as registered
data, pattern matching means for comparing a standard
pattern of the feature extracted by said feature
extraction means with the standard patterns stored in
10 said storage means so as to recognize a predetermined
one of the stored standard patterns which matches the
standard pattern of the extracted feature, speech
synthesis means for outputting through said
15 input/output means a speech corresponding to said
predetermined stored standard pattern read out from
said storage means so as to confirm a result of the
recognition made in said pattern matching means,
dialing means for dialing to a predetermined one of
20 the telephone numbers stored in said storage part and
corresponding to said predetermined standard pattern
in a voice-dialing mode, area code editing means for
editing an area code of the telephone numbers stored
in said storage means, and control means for
25 controlling operation sequences of said feature

1 extraction means, said storage means, said pattern
matching means, said speech synthesis means, said
dialing means and said area code editing means, said
control means controlling said area code editing
5 means to delete and/or renew at least an area code of
a specific telephone number stored in said storage
means in response to an edit instruction received
from said input/output means.

According to another aspect of the present
10 invention, there is provided a voice actuated dialing
apparatus comprising input/output means for inputting
and outputting data, feature extraction means for
extracting a feature of an input data received
through said input/output means, storage means for
15 storing standard patterns and corresponding telephone
numbers of destination subscribers as registered data
and for storing a last dialed telephone number,
pattern matching means for comparing a standard
pattern of the feature extracted by said feature
extraction means with the standard patterns stored in
20 said storage means so as to recognize a predetermined
one of the stored standard patterns which matches the
standard pattern of the extracted feature, speech
synthesis means for outputting through said
25 input/output means a speech corresponding to said

1 predetermined stored standard pattern read out from
 said storage means so as to confirm a result of the
 recognition made in said pattern matching means,
 dialing means for dialing to a predetermined one of
5 the telephone numbers stored in said storage part and
 corresponding to said predetermined standard pattern
 in a voice-dialing mode, and control means for
 controlling operation sequences of said feature
 extraction means, said storage means, said pattern
10 matching means, said speech synthesis means and said
 dialing means, said control means having means for
 detecting whether or not said last dialed telephone
 number is already stored in said storage means as
 registered data.

15 According to another aspect of the present
 invention, there is provided a voice actuated dialing
 apparatus comprising input/output means for inputting
 and outputting data, feature extraction means for
 extracting a feature of an input data received
20 through said input/output means, storage means for
 storing standard patterns and corresponding telephone
 numbers of destination subscribers as registered data
 and for storing messages related to an answering
 phone mode, pattern matching means for comparing a
25 standard pattern of the feature extracted by said

1 feature extraction means with the standard patterns
stored in said storage means so as to recognize a
predetermined one of the stored standard patterns
which matches the standard pattern of the extracted
5 feature, speech synthesis means for outputting
through said input/output means a speech
corresponding to said predetermined stored standard
pattern read out from said storage means so as to
confirm a result of the recognition made in said
10 pattern matching means, dialing means for dialing to
a predetermined one of the telephone numbers stored
in said storage part and corresponding to said
predetermined standard pattern in a voice-dialing
mode, and control means for controlling operation
15 sequences of said feature extraction means, said
storage means, said pattern matching means, said
speech synthesis means and said dialing means, said
control means using said storage means and said
speech synthesis means in common during the
20 voice-dialing mode and the answering phone mode.

According to another aspect of the present invention, there is provided a voice actuated dialing apparatus comprising input/output means for inputting and outputting data, feature extraction means for extracting a feature of an input data received
25

1 through said input/output means, first storage means
for storing standard patterns and corresponding
telephone numbers of destination subscribers as
registered data, second storage means for storing
5 messages related to an answering phone mode, pattern
matching means for comparing a standard pattern of
the feature extracted by said feature extraction
means with the standard patterns stored in said first
storage means so as to recognize a predetermined one
10 of the stored standard patterns which matches the
standard pattern of the extracted feature, speech
synthesis means for outputting through said
input/output means a speech corresponding to said
predetermined stored standard pattern read out from
15 said first storage means so as to confirm a result of
the recognition made in said pattern matching means,
dialing means for dialing to a predetermined one of
the telephone numbers stored in said first storage
part and corresponding to said predetermined standard
20 pattern in a voice-dialing mode, and control means
for controlling operation sequences of said feature
extraction means, said first and second storage
means, said pattern matching means, said speech
synthesis means and said dialing means, said control
25 means using said speech synthesis means in common

1 during the voice-dialing mode and the answering phone
mode, at least one of said first and second storage
means being detachable with respect to said voice
actuated dialing apparatus.

5 According to another aspect of the present
invention, there is provided a voice actuated dialing
apparatus comprising input/output means for inputting
and outputting data, feature extraction means for
extracting a feature of an input data received
10 through said input/output means, storage means for
storing standard patterns and corresponding telephone
numbers of destination subscribers as registered data
and for storing a last dialed telephone number,
pattern matching means for comparing a standard
15 pattern of the feature extracted by said feature
extraction means with the standard patterns stored in
said storage means so as to recognize a predetermined
one of the stored standard patterns which matches the
standard pattern of the extracted feature, speech
synthesis means for outputting through said
20 input/output means a speech corresponding to said
predetermined stored standard pattern read out from
said storage means so as to confirm a result of the
recognition made in said pattern matching means,
25 dialing means for dialing to a predetermined one of

1 the telephone numbers stored in said storage part and
corresponding to said predetermined standard pattern
in a voice-dialing mode, and control means for
controlling operation sequences of said feature
5 extraction means, said storage means, said pattern
matching means, said speech synthesis means and said
dialing means, said control means controlling said
dialing means to re-dial said last dialed telephone
number stored in said storage means in response to a
10 re-dial instruction.

Another and more specific object of the present invention is to provide a voice-dialing apparatus having means for making a search with respect to registered data within a selected search range. According to the voice-dialing apparatus of the present invention, it is possible to make the search efficiently.

Still another object of the present invention is to provide a voice-dialing apparatus having means for automatically selecting a search range in which a search is to be made with respect to registered data. According to the voice-dialing apparatus of the present invention, it is possible to find a desired registered data with an extremely small burden on the part of the user.

1 A further object of the present invention
is to provide a voice-dialing apparatus having means
for registering a plurality of telephone numbers with
respect to one destination subscriber. According to
5 the voice-dialing apparatus of the present invention,
it is possible to automatically dial a telephone
number of a destination subscriber when the line is
busy for another telephone number of the same
destination subscriber.

10 Another object of the present invention is
to provide a voice-dialing apparatus having means for
storing together with the registered data an
information related to a frequency of use of each
registered telephone number and/or an information
15 related to a recognition rate of each registered key
word (that is, name of destination subscriber).
According to the voice-dialing apparatus of the
present invention, it is possible to edit the
registered data most effectively by use of the stored
20 information, where the editing includes deletion,
addition and renewal of the registered data.

25 Still another object of the present
invention is to provide a voice-dialing apparatus
having means for registering a last dialed telephone
number. According to the voice-dialing apparatus of

1 the present invention, it is possible to reduce the
burden on the user when registering telephone numbers.

A further object of the present invention
is to provide a voice-dialing apparatus having means
5 for extracting registered telephone numbers with or
without an area code. According to the voice-dialing
apparatus of the present invention, it is possible to
adjust the registered data when the voice-dialing
apparatus is moved from a first region to a second
10 region which uses an area code different from that of
the first region.

Another object of the present invention is
to provide a voice-dialing apparatus having means for
detecting whether or not a dialed telephone number is
15 already registered. According to the voice-dialing
apparatus of the present invention, it is possible to
register by a simple operation the dialed telephone
number which is not yet registered.

Still another object of the present
20 invention is to provide a voice-dialing apparatus in
which a voice output part is used in common for a
voice-dialing and an answering phone. According to
the voice-dialing apparatus of the present invention,
it is possible to realize the answering phone mode in
25 addition to the voice-dialing mode without making the

1 construction of the voice-dialing apparatus complex.

A further object of the present invention
is to provide a voice-dialing apparatus which has a
detachable external storage. There are two kinds of
5 external storages, a first kind which stores the
standard patterns for recognition and response and a
second kind which stores messages related to the
answering phone mode. According to the voice-dialing
apparatus of the present invention, the flexibility
10 of the apparatus is improved because the storage
capacity of the first and second kinds of external
storages may be selected depending on the needs of
the user. Furthermore, the user may make a
voice-dialing on an arbitrary voice-dialing apparatus
15 by connecting thereto the first external storage.

Another object of the present invention is
to provide a voice-dialing apparatus having means for
setting a mode to one of a normal mode in which a
voice-dialing can be made and an answering phone
20 mode. According to the voice-dialing apparatus of
the present invention, it is possible to effectively
utilize a voice output part for both the normal mode
and the answering phone mode.

Still another object of the present
25 invention is to provide a voice-dialing apparatus

1 having means for detecting whether or not a
detachable external storage for storing standard
patterns for recognition and response and
corresponding telephone numbers is connected to the
5 voice-dialing apparatus. According to the
voice-dialing apparatus of the present invention, it
is possible to automatically switch a mode to a
normal mode in which the voice-dialing can be made
and an answering phone mode depending on whether or
10 not the external storage is connected to the
voice-dialing apparatus, and the burden on the user
is extremely small in setting the mode of the
voice-dialing apparatus.

A further object of the present invention
15 is to provide a voice-dialing apparatus having means
for re-dialing to a last dialed telephone number.
According to the voice-dialing apparatus of the
present invention, it is possible to re-dial the last
dialed telephone number by a simple operation and
20 there is no need to re-enter the telephone number by
voice.

Another object of the present invention is
to provide a voice-dialing apparatus having means for
outputting information related to a last dialed
telephone number before re-dialing. According to the
25

1 voice-dialing apparatus of the present invention, it
is possible for the user to confirm the destination
subscriber to which the re-dialing is made before the
actual re-dialing.

5 Still another object of the present
invention is to provide a voice-dialing apparatus
having means for prestoring at least a standard
pattern of a re-dial instruction. According to the
voice-dialing apparatus of the present invention,
10 there is no need for the user to register the
standard pattern of the re-dial instruction, and the
re-dialing to a last dialed telephone number may be
instructed by voice. This means that there is no
need to provide a key exclusively for instructing the
15 re-dialing.

A further object of the present invention
is to provide a voice-dialing apparatus having means
for outputting information related to a telephone
number which is to be dialed responsive to a voice
20 instruction for confirmation by the user, and means
for automatically dialing to the telephone number
when no instruction is received within a
predetermined time from a time when the information
is outputted. According to the voice-dialing
25 apparatus of the present invention, it is possible to

1 minimize the burden on the user in confirming the
recognition result of the voice-dialing apparatus.

Other objects and further features of the
present invention will be apparent from the following
5 detailed description when read in conjunction with
the accompanying drawings.

FIG.1 is a system block diagram generally
showing an example of a conventional voice-dialing
apparatus;

10 FIG.2 is a system block diagram showing a
first embodiment of a voice-dialing apparatus
according to the present invention;

FIG.3 is a flow chart for explaining an
operation of a control part of the first embodiment;

15 FIG.4 is a system block diagram showing a
second embodiment of the voice-dialing apparatus
according to the present invention;

FIGS.5(A) through 5(C) are time charts for
explaining a preliminary selection and a main
20 selection in the second embodiment;

FIGS.6A and 6B are flow charts for
explaining an operation of a control part of the
second embodiment;

25 FIG.7 is a system block diagram showing a
third embodiment of the voice-dialing apparatus

1 according to the present invention;

FIG.8 is a flow chart for explaining an operation of a control part of the third embodiment when registering data;

5 FIG.9 is a flow chart for explaining an operation of the control part of the third embodiment when making an automatic dialing;

10 FIG.10 is a system block diagram showing a fourth embodiment of the voice-dialing apparatus according to the present invention;

FIG.11 is a diagram for explaining a structure of a data storage of the fourth embodiment;

15 FIG.12 shows an arrangement of keys of a keyboard of the fourth embodiment together with a display part;

FIG.13 is a flow chart for explaining an operation of a control part of the fourth embodiment in a recognition mode;

20 FIG.14 is a flow chart for explaining an operation of the control part of the fourth embodiment in a delete mode;

FIG.15 is a system block diagram showing a fifth embodiment of the voice-dialing apparatus according to the present invention;

25 FIG.16 is a flow chart for explaining an

1 operation of a control part of the fifth embodiment;

FIG.17 is a system block diagram showing a
sixth embodiment of the voice-dialing apparatus
according to the present invention;

5 FIG.18 is a flow chart for explaining an
operation of a control part of a seventh embodiment
of the voice-dialing apparatus according to the
present invention;

10 FIG.19 is a system block diagram showing an
eighth embodiment of the voice-dialing apparatus
according to the present invention;

FIG.20 is a system block diagram showing a
ninth embodiment of the voice-dialing apparatus
according to the present invention;

15 FIG.21 is a flow chart for explaining an
operation of a control part of the ninth embodiment;

FIG.22 is a system block diagram showing a
tenth embodiment of the voice-dialing apparatus
according to the present invention;

20 FIG.23 is a flow chart for explaining an
operation of a control part of the tenth embodiment;

FIG.24 is a system block diagram showing an
eleventh embodiment of the voice-dialing apparatus
according to the present invention;

25 FIG.25 is a flow chart for explaining an

1 operation of a control part of the eleventh
embodiment;

FIG.26 is a flow chart for explaining a
thirteenth embodiment of the voice-dialing apparatus
5 according to the present invention;

FIG.27 is a flow chart for explaining a
fourteenth embodiment of the voice-dialing apparatus
according to the present invention; and

FIG.28 is a system block diagram showing a
10 fifteenth embodiment of the voice-dialing apparatus
according to the present invention.

FIG.2 shows a first embodiment of a
voice-dialing apparatus according to the present
invention. The voice-dialing apparatus has a handset
15 21, a feature extraction part 22, a voice output
(speech synthesis) part 23, a pattern matching part
24, a first standard pattern storage part 25, a
second standard pattern storage part 26, a dial
circuit 27, a telephone number storage part 28, a
20 control part 29, a keyboard 30, and a display part 31.

First, the user registers standard patterns
(hereinafter referred to as key words) for voice
recognition and response and telephone numbers
corresponding to the standard patterns. When making
25 the registration, it becomes convenient at the time

1 of a search when the key words and the telephone
numbers are grouped because it is then possible to
restrict a range of the search to within a group in
which a desired registered data belongs. It will be
5 assumed for convenience sake hereunder that the
registration is made in groups.

As explained before in conjunction with the
description of the conventional voice-dialing
apparatus, the user may become unable to retrieve a
10 desired one of the registered data, such as the case
where the user forgets the key word of the desired
registered data. In this case, the user instructs a
search from the keyboard 30, and the control part 29
searches the registered data in response to the
15 search instruction and carries out a control so as to
successively output the registered key words in the
second standard pattern storage part 26 by voice
(speech synthesis) through the voice output part 23.
For example, the second standard pattern storage part
20 26 stores identical key words as the first standard
pattern storage part 25. In addition, the control
part 29 reads the registered telephone numbers
corresponding to each of the outputted registered key
words from the telephone number storage part 28 and
25 displays the telephone numbers on the display part 31.

1 When the user knows the group in which the
desired registered data (key word and corresponding
telephone number) belongs, the search can be
restricted to within the group by designating the
5 group from the keyboard 30, for example. But when
the user does not know the group in which the desired
registered data belongs, the search is simply made
with respect to all of the registered data.

In this embodiment, the search instruction
10 is entered from the keyboard 30, but the search
instruction may be made by voice.

The user designates the registered data
when the output by voice and display is the desired
registered data. When the user makes an erroneous
15 designation, the user instructs by voice or from the
keyboard 30 to disregard the designation and output
the previous or next registered data. When the
previous or next registered data is still not the
desired registered data, such an operation of
20 retrieving the previous or next registered data is
repeated until the desired registered data is
outputted. When the desired registered data is
finally outputted, the user instructs the automatic
dialing of the telephone number of the desired
25 registered data through the dial circuit 27, that is,

1 the telephone number of the desired destination
subscriber. Thus, according to this embodiment, the
search for the desired registered data can be made
with a satisfactory efficiency.

5 The voice-dialing apparatus requires the
registration of the key words by voice and the
automatic dialing to the telephone number of the
destination subscriber by the dial circuit 27 is
carried out based on a result of a voice recognition
10 in the pattern matching part 24 which recognizes the
input voice obtained through the feature extraction
part 22 by matching the input voice with the
registered key words in the first standard pattern
storage part 25. The result of the voice recognition
15 is outputted by voice through the second standard
pattern storage part 26 and the voice output part 23
or displayed on the display part 31, so that the user
may confirm the result of the voice recognition
before the telephone call is actually made.

20 The control part 29 of the first embodiment
may be constituted by a microcomputer. FIG.3 is a
flow chart for explaining the operation of the
control part 29 of the first embodiment. A step S1
discriminates whether or not an entry is made from
25 the keyboard 30. When the discrimination result in

1 the step S1 becomes YES, a step S2 discriminates
whether or not the entry from the keyboard 30
instructs a search mode. The process advances to a
step S3 to carry out the instructed operation other
5 than the search when the discrimination result in the
step S2 is NO. On the other hand, when the
discrimination result in the step S2 is YES, a step
S4 enters the data on the group (for example, group
number) which is designated from the keyboard 30. A
10 step S5 makes a search within the designated group,
and a step S6 outputs by voice and display the data
which are found by the search made within the
designated group. A step S7 discriminates whether or
not one of the outputted data is designated by the
15 user, and a step S8 discriminates whether or not the
all of the data within the designated group are
outputted when the discrimination result in the step
S7 is NO. The process is ended when the
discrimination result in the step S8 is YES, but the
20 process returns to the step S5 when the
discrimination result in the step S8 is NO.

On the other hand, when the discrimination
result in the step S7 is YES, a step S9 outputs the
designated data by voice and display. Then, a step
25 S10 discriminates whether or not there is an

1 instruction from the user to retrieve a previous data
or a next data. When the discrimination result in
the step S10 is YES, a step S11 outputs by voice and
display the data prior or next to the data which is
5 first outputted, and the process returns to the step
S10. But when the discrimination result in the step
S10 is NO, a step S12 carries out on the designated
data a process which is instructed by the user.

However, especially when the number of
10 registered data becomes large, the user tends to
forget the key words for retrieving the registered
data of subscribers which are not called frequently.
The search function is useful in such a case. The
search may be started by designating a certain
15 registration number from the user in the case where
the user generally knows the registration numbers
which are assigned to the registered data. For
example, the registration numbers are automatically
assigned to the registered data by the voice-dialing
apparatus in the sequence in which the data are
20 registered. But the search may be made automatically
by the voice-dialing apparatus, and in this case, the
search is made in the sequence of the registration
numbers. But in order to carry out the search with a
25 satisfactory efficiency, that is, complete the search

1 within a short time, it is essential that the user
designate the range to which the search is to be
restricted. Otherwise, in a worst case, the search
must be carried out with respect to all of the
5 registered data until the desired registered data is
found, and this is impractical.

FIG.4 shows a second embodiment of the
voice-dialing apparatus according to the present
invention. In FIG.4, those parts which are
10 essentially the same as those corresponding parts in
FIG.2 are designated by the same reference numerals,
and a description thereof will be omitted. This
embodiment is designed so that the range of the
search is automatically restricted based on an
15 intermediate result which is obtained in a process of
requesting confirmation from the user by voice, for
example. The voice-dialing apparatus has the handset
21, the feature extraction part 22, a voice response
part 35, a dictionary pattern storage 36, a voice
recognition part 37, a dial part 38, and a search
20 part 39. The voice response part 35 includes a code
sequence storage part 40, a digital-to-analog (D/A)
converter 41, and a speech synthesis part 42. The
voice recognition part 37 includes a preliminary
25 selection part 43, a main selection part 44, and a

1 result output part 45. The dial part 38 includes a
telephone number matching part 46 and a dial circuit
47.

5 The voice entered from the handset 21 is
analyzed into feature quantities in the feature
extraction part 22 for recognition and response, and
the extracted features are supplied to the voice
response part 35 and the voice recognition part 37.
The voice response part 35 stores a code sequence of
10 the extracted features in the code sequence storage
part 40, and the code sequence is successively
converted into an analog signal in the D/A converter
41. The analog signal from the D/A converter 41 is
supplied to the speech synthesis part 42 which
15 responds by voice (speech) through the handset 21.

The voice recognition part 37 has the
preliminary selection part 43 which makes a
preliminary selection in conformance with a certain
recognition method by use of a beginning portion or
20 another portion of the voice data, as shown in
FIGS.5(A) through 5(C). FIG.5(A) shows the voice
power versus time characteristic for the case where
the word is "STOP". FIG.5(B) shows a signal which is
obtained by determining a logic level thereof with
25 reference to a predetermined threshold level TH, and

1 FIG.5(C) shows the sequence of the selection. By
making the preliminary selection, it is possible to
restrict the candidates of the word to within a
predetermined range before the main selection is made
5 in the main selection part 44. Thus, the preliminary
selection and the main selection are made and the
result of the main selection is outputted from the
result output part 45 as shown in FIG.5(C). Any
appropriate method may be employed to match the
10 selections made in the preliminary selection part 43
and the main selection part 44, and there is no
restriction on the method to be employed.

When making a search, the voice-dialing
apparatus seeks the user's instruction by voice. The
15 search is instructed by the user when the user
forgets the key word for retrieving the desired
registered data or when the entered key word cannot
be recognized for some reason. Hence, when
retrieving the registered data on Mr. S. Tanaka, for
20 example, the user may not know whether the key word
is "Mr. Tanaka, S." or "Mr. Tanaka, Section Head" and
for this reason the user simply enters "Mr. Tanaka,
---". When the preliminary selection is made based
on this entry "Mr. Tanaka, ---", all of the
25 registered data under the name starting with "Mr.

1 "Ta---" will be selected. Hence, when these
 registered data under the similar names starting with
 "Mr. Ta---" are outputted by voice or displayed in
 the sequence with the greatest similarity to the name
5 "Mr. Tanaka", the user can find the desired
 registered data from the restricted registered data
 selected by the preliminary selection. As a result,
 the desired registered data can be found with a high
 efficiency and with considerably less burden on the
10 user when compared to the case where the user must
 select the desired registered data from all of the
 registered data.

The preliminary selection part 43 restricts
the registered data from which the selection is to be
15 made to approximately 1/3 to 1/5 the total registered
 data. Accordingly, the main selection part 44 makes
 the actual selection from the registered data which
 are automatically restricted to approximately 1/3 to
 1/5 the total registered data.

20 The second embodiment shown in FIG.4 may
 have the construction shown in FIG.2. In this case,
 the voice response part 35 corresponds to the voice
 output part 23, and the dictionary pattern storage 36
 corresponds to the storages 25, 26 and 28. The voice
25 recognition part 37 corresponds to the pattern

1 matching part 24 and the control part 29, and the
dial part 38 corresponds to the dial circuit 27 and
the control part 29. The search part 39 corresponds
to the control part 29. The telephone number storage
5 28 may be a part of the telephone number matching
part 46. The control part 29 may be constituted by a
microcomputer, and FIGS.6A and 6B are flow charts for
explaining the operation of the control part 29 in
the case of the second embodiment.

10 FIG.6A shows one embodiment of the
operation of the control part 29 in the case of the
second embodiment. In FIG.6A, a step S21 reads the
key word which is entered by the user, and this key
word may be unclear due to a change in the user's
15 voice or the like. A step S22 carries out a
preliminary selection to select those registered data
having a relatively high probability that they are
the registered data of the entered key word. A step
S23 successively outputs by voice and display the
20 registered data which are selected by the preliminary
selection. Then, a step S24 enters one of the
outputted registered data which is designated by the
user. It is possible to thereafter advance the
process to a step such as the step S9 shown in FIG.3
25 described before.

1 FIG.6B shows another embodiment of the
operation of the control part 29 in the case of the
second embodiment. In FIG.6B, those parts which are
the same as those corresponding parts in FIG.6A are
5 designated by the same reference numerals, and a
description thereof will be omitted. In FIG.6B, a
step S25 is carried out in place of the step S23
shown in FIG.6A. The step S25 successively outputs
by voice and display the registered data which are
10 selected by the preliminary selection in a sequence
of the greatest similarity to the entered key word.

On the other hand, the voice-dialing
apparatus registers only one telephone number with
respect to one key word, that is, one destination
15 subscriber. Hence, in the case where the destination
subscriber has a plurality of telephone numbers but
the line is busy when the telephone call is made
responsive to the key word corresponding to a first
telephone number, the user must once hang up manually
20 and call again later using the same key word or make
another call using another key word corresponding to
a second telephone number. Thus, when it is only
possible to register one telephone number with
respect to one registered key word, it is both
25 troublesome and time consuming for the user to find a

1 line which is not busy, especially when the user
wishes to use the telephone call on urgent matters
and when one or more telephone numbers of the
destination subscriber is in use for a long period of
5 time. Hence, a description will now be given of an
embodiment which eliminates these problems.

FIG.7 shows a third embodiment of the
voice-dialing apparatus according to the present
invention. In FIG.7, those parts which are
10 essentially the same as those corresponding parts in
FIG.2 are designated by the same reference numerals.
According to this embodiment, it is possible to
register a plurality of telephone numbers with
respect to one key word, that is, one destination
15 subscriber. Furthermore, when the line is busy for
one telephone number of the destination subscriber,
the line is automatically disconnected and an
automatic dialing is carried out for another
telephone number of the same destination subscriber.
20 The operation of automatically disconnecting from the
first telephone number of the destination subscriber
and automatically dialing a second telephone number
of the same destination subscriber may be repeated
until the destination subscriber is reached.
25 In FIG.7, the voice-dialing apparatus has a

1 transmitter 51, a telephone receiver 52, a channel
circuit 53, the feature extracting part 22, the
standard pattern storage 26 for speech synthesis, the
voice output (speech synthesis) part 23, a connection
5 control part 54, the control part 29, the standard
pattern storage 25 for voice recognition, the pattern
matching part 24, a state detector 55, the keyboard
30, a timer 58, the number storage part 28, the dial
circuit 27, and a line control part 56 coupled to
10 lines 57. The transmitter 51 and the telephone
receiver 52 constitute the handset 21.

The feature quantity of the voice entered
from the transmitter 51 is extracted in the feature
extraction part 22. The control part 29 determines
15 depending on a state of the keyboard 30 whether the
extracted feature quantity is to be used as the
standard pattern for recognition or the standard
pattern for speech synthesis and also whether or not
to carry out the pattern matching. When a standard
20 pattern (key word) register button of the keyboard 30
is pushed, the speech synthesis part 23 outputs a
registration guidance by voice through the telephone
receiver 52. Such a registration guidance is
registered in advance so as to guide the user in
25 entering instructions related to the registration of

1 data by voice. Thereafter, the feature of the user's
voice is extracted in the feature extraction part 22
and the extracted feature quantity is registered in
the standard pattern storage 25 as the standard
5 pattern for recognition and in the standard pattern
storage 26 as the standard pattern for speech
synthesis. In this state, when there exist a
plurality of telephone numbers which are to be
registered under the entered key word, the telephone
10 numbers are stored in the telephone number storage
part 28 from the keyboard 30 in a sequence of a
frequency with which these telephone numbers are used
(hereinafter simply referred to as a frequency of
use) or in a sequence which is most convenient for
15 the user.

The control part 29 may be constituted by a
microcomputer, and FIG.8 shows a flow chart for
explaining the operation of the control part 29 when
registering the data in this third embodiment. A
20 step S31 enters the instruction from the standard
pattern (key word) register button. In other words,
no instruction is received when the standard pattern
register button is not pushed. When the instruction
from the standard pattern register key is received, a
25 step S32 outputs a registration guidance requesting

1 the user to enter the telephone number of the
destination subscriber. A step S33 enters the
telephone number of the destination subscriber
entered by the user from the keyboard 30, for
5 example, and a step S34 outputs a registration
guidance requesting the user to enter the key word
for the destination subscriber. A step S35 enters
the key word entered by the user by voice, and a step
S36 outputs by voice or display the telephone number
10 which will be registered for confirmation by the
user. A step S36 discriminates whether or not there
exist a plurality of telephone numbers to be
registered under the same destination subscriber (key
word). When the discrimination result in the step
15 S37 is YES, a step S38 enters the next telephone
number of the same destination subscriber, and the
process returns to the step S36. On the other hand,
when the discrimination result in the step S37 is NO,
a step S39 discriminates whether or not the telephone
20 number of another destination subscriber is to be
registered. The process is ended when the
discrimination result in the step S39 is NO; but the
process returns to the step S31 when the
discrimination result in the step S39 is YES.

25 Next, a description will be given of the

1 operation of the voice-dialing apparatus at the time
of a recognition. In a state where the standard
pattern (key word) register button of the keyboard 30
is not pushed, a dialing guidance similar to the
5 registration guidance described above is outputted to
the user to seek the user's instruction related to
the voice-dialing. When the user enters the
instruction by voice, the feature of the key word is
extracted in the feature extraction part 22. The
10 extracted feature quantity is supplied to the pattern
matching part 24 wherein the extracted feature
quantity is subjected to a pattern matching with the
standard patterns for recognition stored in the
standard pattern storage 25. The pattern matching
part 24 outputs as the recognition result a feature
15 quantity having a highest similarity to the extracted
feature quantity. This recognition result is
supplied to the control part 29. When a plurality of
telephone numbers are stored in the telephone number
storage 28 with respect to the recognition result,
20 the control part 29 automatically reads one of the
telephone numbers. For example, the telephone
numbers are read out from the telephone number
storage 28 in the sequence of the highest frequency
25 of use. The selected telephone number is supplied to

1 the dial circuit 27, and the dialing is automatically
made to the desired destination subscriber through
the line control part 56. The recognition result
from the pattern matching part 24 is also supplied to
5 the speech synthesis part 23 and the corresponding
key word is outputted to the user through the
telephone receiver 52 so that the user may confirm
the desired destination subscriber.

Next, when the first dialed telephone
10 number is detected as being busy in the state
detector 55, the dialing is automatically stopped and
the line is once disconnected by the line control
part 56. The control part 29 then reads out another
15 telephone number from the telephone number storage 28
and supplies the selected telephone number to the
dial circuit 27, so as to automatically make the
dialing to the desired destination subscriber through
the line control part 56. For example, this other
telephone number which is read has the second highest
20 frequency of use. Such an operation is repeated
until the destination subscriber is reached, unless
the user disconnects the line manually. Hence, the
telephone numbers registered under the same key word
are successively selected in the sequence of the
25 highest frequency of use, for example, until a

1 non-busy line is dialed and the desired destination
subscriber is reached. The successive selection of
the registered telephone numbers may also be made in
the sequence of the largest number, for example. In
5 addition, when a plurality of telephone numbers are
registered under the same key word, it is possible to
take measures so that the order (or arrangement) of
the telephone numbers are automatically rearranged
depending on the frequency of use.

10 FIG.9 shows a flow chart for explaining the
operation of the control part 29 when making an
automatic dialing in this third embodiment. A step
S41 outputs a dialing guidance to seek the user's
instruction related to the voice-dialing. A step S42
15 reads the key word entered by the user by voice, and
a step S43 outputs the recognized result to the user
for confirmation. Here, it is assumed for
convenience sake that the recognized result is
correct and the user confirms the correct recognition
result. Then a step S44 dials the telephone number
20 of the destination subscriber which is recognized
from the key word. A step S45 discriminates whether
or not the line is busy, and the call is made when
the discrimination result in the step S45 is NO. But
when the discrimination result in the step S45 is

1 YES, a step S46 discriminates whether or not another
telephone number of the same destination subscriber
should be dialed automatically. In other words, when
the user hangs up manually, the discrimination result
5 in the step S46 is NO. On the other hand, when the
user does not hang up, the voice-dialing apparatus
automatically enters the sequence of dialing another
telephone number of the same destination subscriber.
When the discrimination result in the step S46 is
10 YES, a step S47 selects another telephone number
registered under the same destination subscriber, and
the process returns to the step S44.

According to this embodiment, it is
possible for the user to register a plurality of
15 telephone numbers with respect to one destination
subscriber. If the line is busy when one of the
telephone numbers registered under a key word is
automatically selected and dialed, another telephone
number registered under the same key word is
20 automatically selected and dialed and such an
operation is repeated until the destination
subscriber is reached. As a result, even when the
line is busy, there is no need for the user to carry
out the troublesome operation of hanging up manually
25 to dial the same number again or dial another

1 telephone number of the destination subscriber.

Furthermore, the function of automatically selecting
the telephone numbers registered under the same key
word until a non-busy line is dialed and the desired
5 destination subscriber is reached is especially
effective when one or more lines of the destination
subscriber is busy and the user needs to reach the
destination subscriber in a hurry.

FIG.10 shows a fourth embodiment of the
10 voice-dialing apparatus according to the present
invention. In FIG.10, those parts which are
essentially the same as those corresponding parts in
FIGS.2 and 7 are designated by the same reference
numerals, and a description thereof will be omitted.

15 The voice-dialing apparatus has a voice recognition
part 61, the speech synthesis part 23, a data storage
63, a dialing part 64, the keyboard 30, the display
part 31, and the handset 21. The voice recognition
part 61 corresponds to the feature extraction part 22
20 and the pattern matching part 24. The dialing part
64 corresponds to the control part 29 and the dial
circuit 27. The data storage 63 corresponds to the
storages 25, 26 and 28.

When the user enters the key word for
25 retrieving the registered data on a desired

1 destination subscriber, the key word is recognized
and the corresponding registered telephone number is
retrieved, and the telephone number of the desired
destination subscriber is automatically dialed by the
5 dialing part 64 to connect thereto through a
subscriber line 68. In addition, the data on the
voice recognition rate and the frequency of use of
the dialed telephone number are calculated, and such
data are stored in the data storage 63.

10 The voice recognition part 61 has a voice
recognition circuit and carries out operations such
as extracting voice data from the voice entered from
the handset 21, storing the voice data in the data
storage 63, comparing the voice data from the handset
15 21 and the voice data stored in the data storage 63,
and recognizing the destination subscriber which is
designated by the voice (key word).

As shown in FIG.11, the data storage 63 has
a plurality of descriptors 69 and a message data area
20 74 in which the voice message data are stored. The
descriptor 69 has a voice data area 70 for storing
the voice data indicating each destination
subscriber, a dial number area 71 in which the
telephone numbers of the destination subscriber
25 corresponding to the voice data is stored, a

1 frequency of use descriptive area 72 in which the
frequency of use of the telephone number stored in
the dial number area 71 is written, and a recognition
rate descriptive area 73 in which the recognition
5 rate of the voice data stored in the audio data area
70 is written. The contents of the areas 70 through
73 are rewritten when necessary.

In addition, the speech synthesis part 23
has a speech synthesis circuit and makes access to
10 the message data area 74 of the data storage 63 so as
to extract a voice message data based on a control
signal from the dialing part 64. The speech
synthesis part 23 outputs the message voice through
the handset 21 by speech synthesis. When an
15 answerback instruction and a destination subscriber
data are supplied from the voice recognition part 61,
the speech synthesis part 23 makes access to each
descriptor 69 of the data storage 63 so as to extract
the voice data based on the destination subscriber
20 data. Hence, the subscriber name (or key word) is
outputted through the handset 21 by speech synthesis.

FIG.12 shows an arrangement of keys of the
keyboard 30 together with the display part 31. The
keyboard 30 generally has a ten key 75, a register
25 key 76, a search key 77, a delete key 78, a renew key

1 79, a voice dial key 80, and a cancel key 81. When
one of the keys of the keyboard 30 is pushed, a
corresponding key code signal is generated and
supplied to the dialing part 64.

5 The display part 31 is made of a liquid
crystal display unit or the like. When a display
data is received from the dialing part 64, the
display part 31 displays the display data thereon.

10 The dialing part 64 has a register mode, a
recognition mode, a delete mode, a search mode, and a
renew mode. The dialing part 64 is set to one of
these modes and controls other parts of the
voice-dialing apparatus when a corresponding one of
the register key 76, the voice dial key 80, the
15 delete key 78, the search key 77, and the renew key
79 is pushed.

20 In the case where the register mode is
selected by pushing the register key 76, the dialing
part 64 controls the speech synthesis part 23 so as
to output a predetermined guidance by voice through
the handset 21. The predetermined guidance requests
the user to enter the telephone number of the
destination subscriber from the keyboard 30 and to
enter the name (key word) of the destination
25 subscriber. Thus, the user makes the requested

1 entry. At the same time, the dialing part 64 selects
an empty descriptor 69 in the data storage 63 and
stores the telephone number and the voice data on the
destination subscriber into this empty descriptor
5 69. In addition, the frequency of use is set to "0"
in the descriptive area 72 of this descriptor 69 and
the recognition rate is set to "0" in the descriptive
area 73 of this descriptor 69.

On the other hand, when the recognition
10 mode is selected by pushing the voice dial key 80,
the dialing part 64 controls the voice recognition
part 61 so as to carry out a matching of the name
(key word) of the destination subscriber entered from
the handset 21 and the voice data registered in the
15 data storage part 63 and recognize the name (key
word) entered from the handset 21. Thereafter, the
dialing part 64 controls the speech synthesis part 23
to output the recognized name (key word) through the
handset 21 by speech synthesis. In other words, an
answerback is made so that the user may confirm the
20 result of the recognition.

When the result of the recognition is
correct, the user enters a message to confirm by
voice through the handset 21 or from the keyboard
25 30. The dialing part 64 reads out the telephone

1 number corresponding to the recognized name (key
word) from the data storage 63 when a confirmation is
received from the user, and the dialing part 64
automatically dials to this telephone number thereby
5 connecting the handset 21 to the subscriber line 68.
When reading out the telephone number from the data
storage 63, the dialing part 64 increments by one the
value of the frequency of use stored in the
descriptive area 72 of the descriptor 69 in which
10 this telephone number is stored and the value of the
recognition rate stored in the descriptive area 73 of
the descriptor 69 in which this telephone number is
stored.

On the other hand, when the result of the
15 recognition is incorrect and an incorrect answerback
is received, the user enters a message to indicate by
voice through the handset 21 or from the keyboard 30
that the recognition is incorrect. In this case, the
dialing part 64 controls the speech synthesis part 23
20 so as to again output a guidance requesting the user
to enter the name (key word) of the destination
subscriber. When the user thereafter enters the name
(key word) of the destination subscriber by voice,
the dialing part 64 controls the voice recognition
25 part 61 so as to carry out a matching of the name

1 (key word) of the destination subscriber entered from
the handset 21 and the voice data registered in the
data storage part 63 and recognize the name (key
word) entered from the handset 21. Thereafter, the
5 dialing part 64 controls the speech synthesis part 23
to output the recognized name (key word) through the
handset 21 by speech synthesis. In other words, an
answerback is made so that the user may confirm the
result of the recognition.

10 When the result of the recognition made for
the second time is correct, the user enters a message
to confirm by voice through the handset 21 or from
the keyboard 30. The dialing part 64 reads out the
telephone number corresponding to the recognized name
15 (key word) from the data storage 63 when a
confirmation is received from the user, and the
dialing part 64 automatically dials to this telephone
number thereby connecting the handset 21 to the
subscriber line 68. When reading out the telephone
20 number from the data storage 63, the dialing part 64
increments by one the value of the frequency of use
stored in the descriptive area 72 of the descriptor
69 in which this telephone number is stored, however,
25 the dialing part 64 does not increment the value of
the recognition rate stored in the descriptive area

1 73 of the descriptor 69 in which this telephone
number is stored because the name (key word) was not
correctly recognized the first time.

5 FIG.13 is a flow chart for explaining an
operation of the control part 29 (that is, a part of
the dialing part 64) of the fourth embodiment in the
recognition mode. A step S51 makes a voice
recognition of the voice entry made by the user, and
a step S52 outputs the recognized result (key word)
10 for confirmation by the user. A step S53
discriminates whether or not the user confirms the
recognized result as being correct. When the
recognized result is incorrect and the discrimination
result in the step S53 is NO, the process returns to
15 the step S51. On the other hand, when the
discrimination result in the step S53 is YES, a step
S54 automatically dials the telephone number of the
recognized destination subscriber (key word). In
addition, a step S55 increments by one the frequency
20 of use of the destination subscriber.

In the case where the delete mode is
selected by pushing the delete key 78, the dialing
part 64 controls the speech synthesis part 23 so as
to output a predetermined guidance by voice
25 confirming whether or not the user wishes to make a

1 search in carrying out the deletion of the registered
data. When the user enters a message requesting no.
search by voice through the handset 21 or from the
keyboard 30, the dialing part 64 controls the speech
5 synthesis part 23 so as to output a predetermined
guidance requesting the user to enter the name (key
word) of the registered destination subscriber which
is to be deleted. The dialing part 64 also controls
the voice recognition part 61 to recognize the
10 destination subscriber, and the content of the
descriptor 69 corresponding to the recognized
subscriber is deleted from the data storage 63.

On the other hand, when the user enters a
message requesting a search in the delete mode, the
15 dialing part 64 successively reads out the frequency
of use stored in the descriptive area 72 of each
descriptor 69 in the data storage 63 and sorts
(rearranges) the frequency of use in the sequence of
the lowest frequency. The dialing part 64 thereafter
20 controls the speech synthesis part 23 to select and
output through the handset 21 by speech synthesis the
name (key word) of the destination subscriber having
the lowest frequency of use. Moreover, this
frequency of use is also displayed on the display
25 part 31. When the user pushes the delete key 78 in

1 this state, the dialing part 64 erases the descriptor
69 of the destination subscriber which is selected at
that time. On the other hand, when the user pushes a
next candidate key (not shown) of the keyboard 30,
5 the dialing part 64 selects and outputs through the
handset 21 by speech synthesis the name (key word) of
the destination subscriber having the second lowest
frequency of use, and this name (key word) is also
displayed on the display part 31. The search for the
10 desired registered data which is to be deleted may be
carried out similarly thereafter. When the desired
deletion is completed and the cancel key 81 is
pushed, the dialing part 64 ends the delete mode.

FIG.14 is a flow chart for explaining an
15 operation of the control part 29 (that is, a part of
the dialing part 64) of the fourth embodiment in the
delete mode. A step S61 discriminates whether or not
a search is to be carried out. When the
discrimination result in the step S61 is YES, a step
20 S62 discriminates whether or not all of the
registered destination subscribers have been
outputted. When the discrimination result in the
step S62 is NO, a step S63 outputs a destination
subscriber (key word) which has not yet been
25 outputted and has the lowest frequency of use among

1 those destination subscribers which have not yet been
outputted. A step S64 discriminates whether or not
to delete the destination subscriber which is
outputted based on an instruction entered by the
5 user. A step S65 deletes the destination subscriber
(and the corresponding telephone number) when the
discrimination result in the step S64 is YES, and the
process advances to a step S66. But when the
discrimination result in the step S64 is NO, the
10 process jumps to the step S66. The step S66
discriminates whether or not to end the delete mode.
The process returns to the step S62 when the
discrimination result in the step S66 is NO. The
process is ended when the discrimination result in
15 the step S62 or S66 is YES.

On the other hand, when the discrimination
result in the step S68 is NO, a step S68 makes a
voice recognition of the voice entry. A step S69
outputs the name (key word) of the recognized
20 destination subscriber, and a step S70 discriminates
whether or not the user confirms the recognized
result as being correct. When the recognized result
is correct and the discrimination result in the step
S53 is YES, a step S71 deletes the destination
25 subscriber (and the corresponding telephone number),

1 and the process advances to a step S72. But when the
discrimination result in the step S70 is NO, the
process jumps to the step S72. The step S72
discriminates whether or not to end the delete mode,
5 and the process returns to the step S68 when the
discrimination result in the step S72 is NO. On the
other hand, the process is ended when the
discrimination result in the step S72 is YES.

A renew mode is selected when the renew key
10 79 is pushed. In this case, the dialing part 64
controls the speech synthesis part 23 so as to output
a predetermined guidance which confirms whether or
not the user wishes to make a search for renewing the
registered data. When the user enters a message
15 requesting no search by voice through the handset 21
or from the keyboard 30, the dialing part 64 controls
the speech synthesis part 23 so as to output a
predetermined guidance requesting the user to enter
the name (key word) of the registered destination
20 subscriber which is to be renewed. The dialing part
64 also controls the voice recognition part 61 to
recognize the destination subscriber, and the content
of the voice data area 70 in the descriptor 69 and
corresponding to the recognized subscriber is renewed.

25 On the other hand, when the user enters a

1 message requesting a search in the renew mode, the
dialing part 64 successively reads out the frequency
of use stored in the descriptive area 72 of each
descriptor 69 and the recognition rate stored in the
5 descriptive area 73 of each descriptor 69 in the data
storage 63. Furthermore, the dialing part 64
calculates the correct recognition rate for each
destination subscriber based on the frequency of use,
the recognition rate, and the following formula,
10 where the correct recognition rate is the rate with
which the recognition is made correctly.

(Correct Recognition Rate)

$$= (\text{Recognition Rate}) / (\text{Frequency of Use})$$

The dialing part 64 thereafter sorts the
15 calculated correct recognition rates in the sequence
of the lowest value. Then, the dialing part 64
controls the speech synthesis part 23 to select and
output through the handset 21 by speech synthesis the
name (key word) of the destination subscriber having
20 the lowest correct recognition rate. Moreover, this
correct recognition rate is also displayed on the
display part 31. When the user pushes the renew key
79 in this state, the dialing part 64 controls the
speech synthesis part 23 to output through the
25 handset 21 by speech synthesis a predetermined

1 guidance which requests the user to enter the name
5 (key word) of the destination subscriber which is
selected at that time. Hence, the dialing part 64
renews the content of the voice data area 70 of the
5 descriptor 69 of the destination subscriber which is
selected at that time.

On the other hand, when the user pushes the
next candidate key of the keyboard 30, the dialing
part 64 selects and outputs through the handset 21 by
10 speech synthesis the name (key word) of the
destination subscriber having the second lowest
correct recognition rate, and this name (key word) is
also displayed on the display part 31. The search
for the desired registered data which is to be
15 renewed may be carried out similarly thereafter.
When the desired renewal is completed and the cancel
key 81 is pushed, the dialing part 64 ends the renew
mode.

Therefore, according to this embodiment, it
20 is possible to automatically extract by use of the
search function those destination subscribers having
a low frequency of use and those destination
subscribers having a low correct recognition rate.
Thus, it is possible to accurately carry out the
25 operations of adding destination subscribers and

1 renew voice data of destination subscribers. In
addition, since the recognition rate and the
frequency of use are displayed when the search is
requested in the renew mode, it is possible to
5 discontinue the renewal registration when the
frequency of use is low even when the correct
recognition rate is small.

Next, a description will be given of a
fifth embodiment of the voice-dialing apparatus
10 according to the present invention, by referring to
FIG.15. In FIG.15, those parts which are essentially
the same as those corresponding parts in FIGS.2 and 7
are designated by the same reference numerals, and a
description thereof will be omitted.

15 First, a description will be given of the
operation of the fifth embodiment in the register
mode. When making a general registration of the
data, the user instructs the registration mode from
the keyboard 30. When the control part 29 receives
20 this instruction from the keyboard 31, the control
part 29 controls the display part 31 so as to display
a message requesting the user to enter the telephone
number of the destination subscriber to be
registered. This embodiment enters the instruction
25 from the keyboard 30 and displays the message on the

1 display part 31, but it is of course possible to
enter the instruction by voice through the handset 21
and also output the message by voice through the
handset 21.

5 The user enters the telephone number of the
destination subscriber to be registered in accordance
with the message displayed on the display part 31.
The entered telephone number is stored in the
telephone number storage 28. Thereafter, the control
10 part 29 controls the display part 31 so as to display
a message requesting the user to enter by voice the
name (key word) of the destination subscriber to be
registered. When the user enters the key word by
voice through the handset 21, the feature quantity of
15 the key word is extracted in the feature extraction
part 22 and the standard pattern for recognition and
the standard pattern for response are respectively
stored in the standard pattern storages 25 and 26.

Next, a description will be given of the
20 operation of the fifth embodiment in the dialing
mode. In the dialing mode, the dial circuit 27
outputs a signal on the line and also outputs the
telephone number to a telephone number storage 90.
This telephone number storage 90 stores the telephone
25 number which is dialed last. Hence, this last dialed

1 telephone number stored in the telephone number
storage 90 may be registered similarly as in the case
of the register mode.

In other words, when the user wishes to
5 register the last dialed telephone number, the user
instructs the register mode from the keyboard 30.
When the control part 29 receives this instruction
from the keyboard 31, the control part 29 controls
the display part 31 so as to display a message
10 requesting the user to enter the telephone number of
the destination subscriber to be registered. In this
case, the user instructs the voice-dialing apparatus
from the keyboard 30 to read out the last dialed
telephone number stored in the telephone number
15 storage 90. The control part 29 reads the last
dialed telephone number from the telephone number
storage 90, and stores and registers this telephone
number in the telephone number storage 28.
Thereafter, the key word is entered similarly as in
20 the case of the general register mode described above.

In this embodiment, it is of course
possible to omit the telephone number storage 90 and
use a portion of the telephone number storage 28 for
temporarily storing the last dialed telephone
25 number. If there is no instruction to register the

1 last dialed telephone number, the content of the
telephone number storage 90 is erased and rewritten
by a telephone number which is dialed.

FIG.16 shows a flow chart for explaining
5 the operation of the control part 29 of the fifth
embodiment. A step S81 supervises a manual dialing,
and a step S82 detects an end of the call. A step
S83 detects the instruction from the user to set the
mode of the voice-dialing apparatus to the register
10 mode, and a step S84 outputs the message requesting
the user to enter the telephone number to be
registered. A step S85 detects the instruction from
the user to register the last dialed telephone number
stored in the telephone number storage 90. A step
15 S85 reads out the last dialed telephone number from
the telephone number storage 90 and registers the
same in the telephone number storage 28. A step S87
outputs the message requesting the user to enter the
name (key word) of the destination subscriber the
20 telephone number of which is now being registered,
and a step S88 detects and registers the key word
entered by the user.

Next, a description will be given of a
sixth embodiment of the voice-dialing apparatus
25 according to the present invention, by referring to

1 FIG.17. In FIG.17, those parts which are essentially
the same as those corresponding parts in FIGS.2 and 7
are designated by the same reference numerals, and a
description thereof will be omitted. This embodiment
5 is provided with an area code editing part 92. The
area code editing part 92 is shown in FIG.17 as
having an area code selection part 92a and an area
code discrimination part 92b, but it is not essential
to provide both the parts 92a and 92b. In other
10 words, the area code editing part 92 may be made up
of the area code selection part 92a and/or the area
code discrimination part 92b.

First, a description will be given of the
case where the area code editing part 92 is made up
15 solely of the area code selection part 92a. When an
area code is designated by the user, the area code
selection part 92a selects the registered telephone
numbers which are stored in the telephone number
storage 28 and have the designated area code. Hence,
20 it is possible to delete the designated area code
from all of the registered telephone numbers selected
by the area code selection part 92a.

It is assumed in FIG.17 that the telephone
numbers corresponding to the standard pattern for
25 voice recognition and response are already registered

1 in the telephone number storage 28. For example,
when the user moves from a first region (for example,
Tokyo) having a first area code (for example, "03")
to a second region (for example, Yokohama) having a
5 second area code (for example, "045") and takes the
telephone with him, the telephone number of a friend
living in the second region is already registered
together with the second area code. But when dialing
this friend within the second region, there is no
10 need to dial the second area code. Hence, in this
case, the user instructs the control part 29 from the
keyboard 30 to delete the second area code from all
of the registered telephone numbers having the second
area code. The control part 29 controls the area
15 code selection part 92a to select those registered
telephone numbers which are stored in the telephone
number storage 28 and have the second area code. In
addition, the control part 29 deletes the second area
code from all of the registered telephone numbers
20 selected by the area code selection part 92a and
re-registers all of these telephone numbers in the
telephone number storage 28 in one operation but
without the second area code.

Next, a description will be given of the
25 case where the area code editing part 92 is made up

1 solely of the area code discrimination part 92b. The
area code discrimination part 92b discriminates
whether or not the telephone numbers registered in
the telephone number storage 28 have area codes. By
5 selecting the registered telephone numbers without
the area code, it is possible to add a predetermined
area code to all of these selected telephone numbers.

When the user moves from the first region
to the second region as described above, the
10 telephone number of a friend living in the first
region is registered without the first area code.
But when dialing this friend from the second region,
there is a need to dial the first area code. Hence,
in this case, the user instructs the control part 29
15 from the keyboard 30 to add (or insert) the first
area code to all of the registered telephone numbers
not having an area code. The control part 29
controls the area code discrimination part 92b to
select those registered telephone numbers which are
20 stored in the telephone number storage 28 and do not
have the area code. In addition, the control part 29
adds the first area code to all of the registered
telephone numbers selected by the area code
discrimination part 92b and re-registers all of these
25 telephone numbers in the telephone number storage 28

1 in one operation but with the first area code added
thereto.

When the area code editing part 92 is made
up of both the area code selection part 92a and the
5 area code discrimination part 92b, it is evident that
it is possible to delete a certain area code from all
of the registered telephone numbers having the
certain area code and also add an area code to all of
the registered telephone numbers not having an area
10 code, both in one operation.

Next, a description will be given of a
seventh embodiment of the voice-dialing apparatus
according to the present invention, by referring to
FIG.10 since the block system is the same as that of
15 the fourth embodiment described before. In this
seventh embodiment, when a telephone number is dialed
manually from the keys, a check is made to determine
whether or not this telephone number is already
registered for enabling the voice-dialing. When it
20 is determined that this telephone number is not yet
registered, the name (key word) of the destination
subscriber is entered by voice so that the necessary
information on this destination subscriber is
registered.

25 As described before in conjunction with

1 FIG.11, the data storage 63 has the plurality of
descriptors 69 and the message data area 74 in which
the voice message data are stored. The descriptor 69
has at least the voice data area 70 for storing the
5 voice data indicating each destination subscriber,
and the dial number area 71 in which the telephone
number of the destination subscriber corresponding to
the voice data is stored. The contents of the areas
70 and 71 are rewritten when necessary.

10 The keyboard 30 has the construction
described before in conjunction with FIG.12.

The dialing part 64 has a main register
mode, an auxiliary register mode, the recognition
mode, the delete mode, the search mode, and the renew
15 mode. The dialing part 64 is set to one of these
modes and controls other parts of the voice-dialing
apparatus when a corresponding one of the register
key 76, the voice dial key 80, the delete key 78, the
search key 77, and the renew key 79 shown in FIG.12
20 is pushed.

In the case where the main register mode is
selected by pushing the register key 76, the dialing
part 64 controls the speech synthesis part 23 so as
to output a predetermined guidance by voice through
25 the handset 21. The predetermined guidance requests

1 the user to enter the telephone number of the
destination subscriber from the keyboard 30 and to
enter the name (key word) of the destination
subscriber. Thus, the user makes the requested
5 entry. At the same time, the dialing part 64 selects
an empty descriptor 69 in the data storage 63 and
stores the telephone number and the voice data on the
destination subscriber into this empty descriptor 69.

On the other hand, the auxiliary register
10 mode is selected by pushing the register key 76 in
combination with another predetermined key when no
key is provided exclusively for selecting the
auxiliary register mode or by pushing an auxiliary
register key (not shown) when the auxiliary register
15 key is provided exclusively for selecting the
auxiliary register mode. In this case, the dialing
part 64 (that is, a control part) carries out the
process according to a flow chart shown in FIG.18.

In FIG.18, a step ST1 discriminates whether
20 or not a call is to be started. A step ST2
discriminates whether or not a voice-dialing is to be
made when the discrimination result in the step ST1
becomes YES. When the discrimination result in the
step ST2 is YES, a step ST10 makes the voice-dialing
25 in response to the key word entered by voice and the

1 process is ended. However, when the discrimination
result in the step ST2 is NO and a dialing is to be
made manually from the keyboard 30, a step ST3 reads
a key code entered from the keyboard 30 and dials a
5 telephone number described by the key code. Then a
step ST4 discriminates whether or not an automatic
register key (not shown) is pushed. Instead of
providing this automatic register key, it is also
possible to set the mode to the automatic register
10 mode by pushing the register key 76 in combination
with another key. The process is ended when the
discrimination result in the step ST4 is NO.

But when the discrimination result in the
step ST4 is YES, a step ST5 discriminates whether or
15 not the dialed telephone number is already
registered. The process is ended when the
discrimination result in the step ST5 is YES. A step
ST6 discriminates whether or not the telephone call
is ended when the discrimination result in the step
20 ST5 is NO. The end of the telephone call may be
detected in various manners such as when the user
hangs up, a predetermined time elapses after the user
hangs up, and the user picks up the handset 21 after
hanging up.

25 When the discrimination result in the step

1 ST6 becomes YES, a step ST7 discriminates whether or
not the name (key word) of the destination subscriber
having the telephone number dialed in the step ST3 is
to be registered. For example, the dialing part 64
5 controls the speech synthesis part 23 to output a
guidance (or message) saying "Do you wish to register
the name of destination subscriber (key word) ?".
When the user responds "YES" to this message by
pushing the register key 76, for example, the
10 discrimination result in the step ST7 becomes YES and
the process advances to a step ST8. On the other
hand, when the user does not respond even after a
predetermined time or when the cancel key 81 is
pushed, for example, the discrimination result in the
15 step ST7 becomes NO and the process is ended.

The step ST8 enters the key word entered by
voice. For example, the dialing part 64 controls the
speech synthesis part 23 to output a guidance saying
"please enter name of destination subscriber (key
20 word)", and enters the key word which is entered by
the user in response to this guidance. Then, a step
ST9 registers the key word (voice data) and the
corresponding telephone number. In other words, the
dialing part 64 controls the voice recognition part
25 61 to produce the voice data corresponding to the key

1 word, and then selects an empty descriptor 69 in the
data storage 63 and stores the telephone number and
the voice data on the destination subscriber into
this empty descriptor 69.

5 The dialing part 64 of the voice-dialing
apparatus is set to the recognition mode when the
discrimination result in the step ST2 is YES and the
process advances to the step ST10. The operations of
the voice-dialing apparatus in the recognition mode,
10 the delete mode and the renew mode are basically the
same as those of the fourth embodiment described
before, and a description thereof will be omitted.

According to this seventh embodiment, a
message is outputted to seek the user's instruction
15 on whether or not to register a telephone number when
this telephone number is dialed manually from the
keyboard 30 and is not yet registered in the data
storage 63. Hence, after each telephone call is made
by dialing from the keyboard 30, the user simply
20 needs to confirm the need for registration in order
to register the telephone number which is not yet
registered, and the burden on the user in registering
the telephone numbers is considerably reduced
compared to the case where all of the telephone
25 numbers to be registered are registered at one time.

1 Furthermore, since the voice-dialing apparatus
automatically checks whether or not the manually
dialed telephone number is already registered, it is
possible to positively prevent the same telephone
5 number from being registered a plurality of times and
thus most efficiently utilize the limited storage
capacity of the data storage 63.

Next, a description will be given of an
eighth embodiment of the voice-dialing apparatus
10 according to the present invention, by referring to
FIG.19. The voice-dialing apparatus has the handset
21 including a microphone 21a and a speaker 21b, a
voice response part 93, a control part 94, an adder
95, a voice recognition part 96, and a switching part
15 97. The voice response part 93 has a voice response
control part 93a, a memory 93b for response, and a
memory 93c for answering phone. The switch part 97
has a voice dial switch 97a, a register switch 97b,
and a search/playback switch 97c. The handset 21 may
20 be made up of parts other than the microphone 21a and
the speaker 21b as long as equivalent functions are
obtainable.

The voice response part 93 prestores the
voice data for guidance and the names of the
25 destination subscribers in the memory 93b in a

1 digitized form, and the voice data is converted into
a corresponding audio signal in the voice response
control part 93a based on an instruction from the
control part 94 and this audio signal is supplied to
5 the adder 95. The adder adds the audio signal from
the response part 93 and the audio signal from the
destination subscriber received through the line and
the control part 94, and supplies an added signal to
the speaker 21b of the handset 21. The control part
10 94 carries out control such as the control of the
dialing, the control of the registration, search,
deletion and the like of the telephone numbers and
key words for enabling the voice-dialing, and the
control of the answering phone. The voice
15 recognition part 96 stores the names (key words) of
the destination subscribers in the form of a
dictionary, and recognizes the key word of the
destination subscriber by comparing the key word
entered from the microphone 21a and the registered
key words. The result of the recognition is supplied
20 to the control part 94. The voice recognition part
96 may use any kind of recognition methods.

The following Table shows the relationship
between the states of the switches 97a through 97c of
25 the switch part 97 and the mode of the voice-dialing

1 apparatus. When making the voice-dialing, the voice
dial switch 97a is turned ON and the voice-dialing is
made by entering the key word by voice. The
registration and search of the telephone number and
5 key word may be made by turning ON the respective
switches 97b and 97c of the switch part 97.

Table

Mode Switch	Voice Dialing	Answering Phone	Manual Dialing
SW 97a	ON	OFF	OFF
SW 97b	ON/OFF	ON/OFF	OFF
SW 97c	OFF/ON	OFF/ON	OFF

15 Next, a description will be given of the
operation of this eighth embodiment in the answering
phone mode. The answering phone mode is selected by
turning OFF the voice dial switch 97a and turning ON
the register switch 97b. When a telephone call is
received from an arbitrary subscriber, an instruction
20 from the control part 94 is supplied to the voice
response part 93 so as to output a guidance for
answering phone, and this guidance is transmitted to
the arbitrary subscriber through the control part 94
and the line. Then, a signal (for example, a beep)
25 requesting the caller to leave a message is

1 transmitted on the line from the control part 94 and
the voice response part 93 assumes a recording mode.
In the recording mode, the message of the caller is
digitized and stored in the memory 93c. An arbitrary
5 digitizing method may be used, and for example, it is
possible to employ a waveform compression system such
as the ADPCM. The search/playback switch 97c is
turned on when playing back the recorded message.
The voice data stored in the memory 93c is supplied
10 to the voice response control part 93a and is
converted into an audio signal which is supplied to
the speaker 21b through the adder 95.

When making the dialing manually, all of
the switches 97a through 97c are turned OFF.

15 According to this embodiment, the voice
response part 93 is used in common for the
voice-dialing and for the answering phone, and only
the memory 93c is additionally required to realize
the answering phone function because the control of
20 the voice-dialing and the control of the answering
phone can be carried out by the same control part.
The control of the voice response part 93 may be
carried out solely by hardware, solely by software,
or a combination of hardware and software. In
25 addition, although the switches 97a through 97c are

1 provided, the corresponding instructions may be made
by voice by registering such voice instructions in
the voice response part 93. By making it possible to
enter the instructions from either one of the
5 keyboard or the handset, it becomes easier to cope
with the initial registration of data and incorrect
recognition made by the voice recognition part 96.

Next, a description will be given of a
ninth embodiment of the voice-dialing apparatus
10 according to the present invention, by referring to
FIG.20. In FIG.20, those parts which are essentially
the same as those corresponding parts in FIG.2 are
designated by the same reference numerals, and a
description thereof will be omitted. In this
15 embodiment, the standard patterns and telephone
numbers are stored in a first external storage which
is detachable to the voice-dialing apparatus, and the
messages of the answering phone are stored in a
second external storage which is also detachable to
20 the voice-dialing apparatus. Hence, when the first
external storage is attached to the voice-dialing
apparatus, it is possible to utilize the
voice-dialing by use of the standard patterns and
telephone numbers stored therein. On the other hand,
25 when the second external storage is attached to the

1 voice-dialing apparatus, it is possible to utilize
the answering phone by use of the messages stored
therein.

The voice-dialing apparatus has a connector
5 101 which functions as an interface, and either one
of first and second external storages 102 and 103 can
be attached to the voice-dialing apparatus through
the connector 101. The first external storage 102
has a standard pattern storage 102a and a telephone
10 number storage 102c, while the second external
storage 102 is for storing the messages related to
the answering phone. The first and second external
storages 102 and 103 respectively store first and
second identification codes for identification.
15 thereof.

Firstly, in the case where the first
external storage 102 is attached to the voice-dialing
apparatus through the connector 101, the control part
29 reads the first identification code stored in the
20 first external storage 102 and sets the mode to the
voice-dialing mode. The operation of the
voice-dialing apparatus in the voice-dialing mode has
already been described heretofore, and the
description thereof will not be repeated. When
25 compared with the first embodiment, for example, the

1 standard pattern storage 102a corresponds to the
storages 25 and 26 and the telephone number storage
102b corresponds to the telephone number storage 28
shown in FIG.2.

5 Secondly, in the case where the second
external storage 103 is attached to the voice-dialing
apparatus through the connector 101, the control part
29 reads the second identification code stored in the
second external storage 103 and sets the mode to the
10 answering phone mode. When a telephone call is
received from an arbitrary subscriber in this
answering phone mode, the control part 29 controls
the voice output part 23 to read and output the
message registered in the second external storage 103
15 on the line. After outputting the message, the
voice-dialing apparatus waits for a message to be
entered by the caller and stores the message from the
caller in the second external storage 103 through the
feature extraction part 22 which extracts the feature
20 quantity of the message.

FIG.21 shows a flow chart for explaining
the operation of the control part 29 of the ninth
embodiment. A step S11 discriminates whether or not
the identification code read from the external
25 storage connected to the connector 101 is the first

1 identification code. When the discrimination result
in the step ST11 is YES, a step ST12 sets the mode to
the normal mode in which the voice-dialing can be
made. On the other hand, when the discrimination
5 result in the step ST11 is NO, a step ST13
discriminates whether or not the identification code
read from the external storage connected to the
connector 101 is the second identification code.
When the discrimination result in the step ST13 is
10 YES, a step ST14 sets the mode to the answering phone
mode. The process returns to the step ST11 when the
discrimination result in the step ST13 is NO.

According to this embodiment, the burden on
the user to switch the mode of the voice-dialing
15 apparatus to the answering phone mode is extremely
small since the user simply needs to connect the
second external storage 103 to the connector 101. In
addition, the storage capacities of the first and
second external storages 102 and 103 may be set
20 depending on the needs of the user, and the
flexibility of the voice-dialing apparatus is
improved compared to the conventional apparatus.

Next, a description will be given of a
tenth embodiment of the voice-dialing apparatus
25 according to the present invention, by referring to

1 FIG.22. In FIG.22, those parts which are essentially
the same as those corresponding parts in FIG.2 are
designated by the same reference numerals, and a
description thereof will be omitted. In this
5 embodiment, there are provided a message storage 111
for storing the messages related to the answering
phone and a set part 112 for setting the mode of the
voice-dialing apparatus to a normal mode or the
answering phone mode. The feature extraction part 22
10 and the voice output part 23 which are used in the
voice-dialing mode are used in common in the
answering phone mode for storing and playing back the
messages.

The set part 112 in this embodiment is
15 constituted by a switch which sets the mode to the
normal mode in a first position and to the answering
phone mode in a second position. When the switch of
the set part 112 is in the first position, the mode
is set to the normal mode and it is possible to make
20 the voice-dialing. On the other hand, when the
switch of the set part 112 is in the second position,
the mode is set to the answering phone mode.

FIG.23 shows a flow chart for explaining
the operation of the control part 29 of the tenth
25 embodiment. A step ST21 discriminates whether or not

1 the switch of the setting part 112 is in the first
position. When the discrimination result in the step
ST21 is YES, a step ST22 sets the mode to the normal
mode in which the voice-dialing can be made. But
5 when the discrimination result in the step ST21 is
NO, a step ST23 sets the mode to the answering phone
mode.

According to this embodiment, the feature
extraction part 22 and the voice output part 23 are
10 used efficiently in the normal mode and the answering
phone mode, thereby avoiding the construction of the
voice-dialing apparatus from becoming complex.

Next, a description will be given of an
eleventh embodiment of the voice-dialing apparatus
15 according to the present invention, by referring to
FIG.24. In FIG.24, those parts which are essentially
the same as those corresponding parts in FIGS.20 and
22 are designated by the same reference numerals, and
a description thereof will be omitted. In this
20 embodiment, a detector 114 is provided to detect
whether or not a detachable external storage 115 is
attached to the connector 101. The external storage
115 has a pattern storage 102a1 for storing standard
patterns for recognition, a pattern storage 102a2 for
25 storing standard patterns for response, and the

1 telephone number storage 102b. When the detector 114
detected that the external storage 115 is not attached
to the connector 101, the control part 29
automatically sets the mode to the answering phone

5 mode. On the other hand, when the detector 114
detected that the external storage 115 is attached to
the connector 101, the control part 29 automatically
sets the mode to the normal mode so that the
voice-dialing can be made.

10 When the user wishes to set the mode of the
voice-dialing apparatus to the answering phone mode,
the user disconnects the external storage 115 from
the connector 101. The disconnected external storage
115 may be connected to the connector 101 of another
15 voice-dialing apparatus when the user wishes to
utilize the voice-dialing function. When the user
disconnects the external storage 115 from the
connector 101, the disconnection is detected by the
detector 114 and the mode is automatically set to the
20 answering phone mode. Therefore, according to this
embodiment, the burden on the user is extremely small
when the user wishes to select the answering phone
mode.

25 FIG.25 is a flow chart for explaining the
operation of the control part 29 of the eleventh

1 embodiment. A step ST31 discriminates whether or not
the detector 114 has detected that the external
storage 115 is connected to the connector 101. When
the discrimination result in the step ST31 is YES, a
5 step ST32 sets the mode to the normal mode in which
the voice-dialing can be made. On the other hand,
when the discrimination result in the step ST31 is
NO, that is, when the detector 114 has detected that
no external storage is connected to the connector
10 101, a step ST33 sets the mode to the answering phone
mode.

Next, a description will be given of a
twelfth embodiment of the voice-dialing apparatus
according to the present invention. Since the block
15 system of the fifth embodiment may also be used in
this embodiment, the description will be given with
reference to FIG.15. In this embodiment, a standard
pattern for recognition of a re-dial instruction is
registered in the pattern storage 25 in advance.
20 Since the last dialed telephone number is stored in
the telephone number storage 90, the user can
instruct by voice to re-dial the last dialed
telephone number. In other words, when a guidance
seeks the user's instruction, the user may instruct
25 by voice and say "re-dial" to instruct the re-dialing

1 of the last dialed telephone number. According to
this embodiment, it is possible to re-dial the last
dialed telephone number with ease, and there is no
need to provide a key exclusively for instructing the
5 re-dialing.

However, according to the twelfth
embodiment, there is a need to register the standard
pattern of the re-dial instruction in advance.
Hence, a description will now be given of a
10 thirteenth embodiment of the voice-dialing apparatus
according to the present invention in which the
burden on the user may be reduced.

FIG.26 shows the thirteenth embodiment of
the voice-dialing apparatus according to the present
15 invention. In FIG.26, those parts which are
essentially the same as those corresponding parts in
FIG.15 are designated by the same reference numerals,
and a description thereof will be omitted. In this
embodiment, a pattern storage 121 prestores the
20 standard pattern of at least one instruction related
to the last dialed telephone number stored in the
telephone number storage 90. For convenience sake,
it is assumed that the standard pattern of "re-dial"
is prestored in the pattern storage 121. Hence, in
25 this embodiment, there is no need for the user to

1 register the standard pattern for the instruction
"re-dial", and the user can instruct the re-dialing
by simply saying "re-dial".

According to the twelfth and thirteenth
5 embodiments, however, the user may mistake the last
dialed telephone number. In this case, a telephone
number not intended by the user is re-dialed without
being confirmed by the user. Thus, a description
will now be given of a fourteenth embodiment of the
10 voice-dialing apparatus according to the present
invention in which this problem may be eliminated.

FIG.27 shows a fourteenth embodiment of the
voice-dialing apparatus according to the present
invention. In FIG.27, those parts which are the same
15 as those corresponding parts in FIG.26 are designated
by the same reference numerals, and a description
thereof will be omitted. In this embodiment, a
telephone number search part 123 is provided to
search at the time of the re-dialing whether or not
20 the last dialed telephone number stored in the
telephone number storage 90 is already registered in
the telephone number storage 28. When the telephone
number search part 123 detects that the last dialed
telephone number is registered in the telephone
25 number storage 28, the corresponding standard pattern

1 for response is read out from the pattern storage 26
and the name (key word) of the destination subscriber
having the last dialed telephone number is outputted
by voice through the voice output part 23 and the
5 handset 21. Therefore, it is possible for the user
to confirm the last dialed telephone number before
the re-dialing is actually made.

Although illustration and description of
such will be omitted, it is possible to provide only
10 one of the pattern storage part 121 and the telephone
number search part 123 depending on the needs of the
user.

Next, a description will be given of a
fifteenth embodiment of the voice-dialing apparatus
15 according to the present invention, by referring to
FIG.28. In FIG.28, those parts which are essentially
the same as those corresponding parts in FIG.7 are
designated by the same reference numerals, and a
description thereof will be omitted. In this
20 embodiment, the timer 58 times a predetermined time
when the recognition result is outputted to the user
for confirmation when making the voice-dialing. When
the user does not enter any instruction during this
predetermined time and the timer 58 supplies to the
25 control part 29 a signal indicating that the

1 predetermined time has elapsed, the control part 29
controls the dial circuit 27 so as to automatically
start the dialing based on the recognized result.
For this reason, there is no need for the user to
5 anything when the recognition result is correct.

On the other hand, when the recognition
result is incorrect, the user cancels the
voice-dialing from the keyboard 30 or by hanging up,
for example, within the predetermined time timed by
10 the timer 58. When the cancel instruction is
received, the control part 29 stops the timing
operation of the timer 58 and stops the dialing.

In the embodiments described heretofore,
various guidances are outputted to guide the user in
15 using the voice-dialing apparatus. However, it is
not essential that such guidances are outputted. For
example, such guidances may be written on a user's
manual.

In addition, the figures for convenience
20 sake illustrate only the essential parts of the
embodiments, and those parts which are not
illustrated in one figure may be readily understood
from another figure. In other words, the figures
showing the block systems only illustrate those parts
25 essential to describe the characterizing features of

1 each embodiment.

Further, the present invention is not limited to these embodiments, but various variations and modifications may be made without departing from
5 the scope of the present invention.

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1 WHAT WE CLAIM IS:

5

1. A voice actuated dialing apparatus comprising:

input/output means for inputting and outputting data;

10 feature extraction means for extracting a feature of an input data received through said input/output means;

storage means for storing standard patterns and corresponding telephone numbers of destination subscribers as registered data;

15 pattern matching means for comparing a standard pattern of the feature extracted by said feature extraction means with the standard patterns stored in said storage means so as to recognize a predetermined one of the stored standard patterns which matches the standard pattern of the extracted feature;

20 speech synthesis means for outputting through said input/output means a speech corresponding to said predetermined stored standard pattern read out from said storage means so as to confirm a result of

- 1 the recognition made in said pattern matching means;
 dialing means for dialing to a predetermined one
 of the telephone numbers stored in said storage part
 and corresponding to said predetermined standard

5 pattern in a voice-dialing mode; and

 control means for controlling operation
 sequences of said feature extraction means, said
 storage means, said pattern matching means, said
 speech synthesis means and said dialing means,

10 said control means successively outputting to
 said input/output means at least a part of the
 registered data stored in said storage means in
 response to a search instruction received from said
 input/output means designating the part to be

15 successively outputted.

- 20 2. A voice actuated dialing apparatus as
 claimed in claim 1 in which said input/output means
 has a handset, a keyboard and a display part.

1 3. A voice actuated dialing apparatus as
claimed in claim 2 in which said control means
successively outputs to said input/output means at
least a part of the registered data stored in said
5 storage means in a predetermined sequence in response
to said search instruction received from said
input/output means.

10

4. A voice actuated dialing apparatus as
claimed in claim 3 in which said control means
successively outputs to said handset through said
15 speech synthesis means at least a part of the
registered data stored in said storage means in a
predetermined sequence in response to said search
instruction received from said input/output means.

20

5. A voice actuated dialing apparatus as
claimed in claim 2 in which at least said
25 predetermined standard pattern is outputted to said

1 handset through said speech synthesis means in the
voice-dialing mode, said control means controlling
said dialing means to dial said predetermined
telephone number only when a confirmation confirming
5 a correct recognition by said pattern matching means
is received from said input/output means.

10

6. A voice actuated dialing apparatus as
claimed in claim 2 in which at least said
predetermined standard pattern is outputted to said
handset through said speech synthesis means in the
15 voice-dialing mode, said control means controlling
said dialing means to dial said predetermined
telephone number when no instruction is received from
said input/output means within a predetermined time
from a time when said predetermined standard pattern
20 is outputted to said handset.

25

7. A voice actuated dialing apparatus as

1 claimed in claim 1 in which at least a certain
standard pattern out of the standard patterns
successively outputted in the search mode is
designated by a designation received from said
5 input/output means, said dialing means dialing to one
of the telephone numbers corresponding to said
certain standard pattern.

10

8. A voice actuated dialing apparatus as
claimed in claim 7 in which said control means
successively outputs to said input/output means at
15 least a part of the registered data stored in said
storage means in response to a search instruction
received from said input/output means designating the
part to be successively outputted.

20

9. A voice actuated dialing apparatus as
claimed in claim 1 in which said control means stores
25 in said storage means a frequency with which each

1 telephone number is used, and said control means
 successively outputs to said input/output means at
 least a part of the registered data stored in said
 storage means in response to a search instruction
5 received from said input/output means designating the
 part to be successively outputted as having a
 predetermined frequency of use.

10

10. A voice actuated dialing apparatus as
 claimed in claim 1 in which said control means stores
 in said storage means a recognition rate of each
15 destination subscriber, and said control means
 successively outputs to said input/output means at
 least a part of the registered data stored in said
 storage means in response to a search instruction
 received from said input/output means designating the
20 part to be successively outputted as having a
 predetermined recognition rate.

25

1 11. A voice actuated dialing apparatus as
claimed in claim 1 in which said pattern matching
means has a preliminary selection part and a main
selection part, said preliminary selection part in
5 response to the search instruction comparing a
certain portion of the standard pattern of the
feature extracted by said feature extraction means
with corresponding portions of the standard patterns
stored in said storage means when the search
10 instruction accompanies a subject of search so as to
select specific standard patterns having a certain
similarity to said certain portion, said main
selection part comparing the standard pattern of the
feature extracted by said feature extraction means
15 with only said specific standard patterns so as to
recognize the predetermined one of the specific
standard patterns which matches the standard pattern
of the extracted feature.

20

12. A voice actuated dialing apparatus as
claimed in claim 11 in which said control means
25 successively outputs to said input/output means only

1 the specific standard patterns selected by said
preliminary selection part in response to a search
instruction received from said input/output means
designating a part of the registered data to be
5 successively outputted.

10 13. A voice actuated dialing apparatus as
claimed in claim 12 in which said specific standard
patterns are successively outputted to said
input/output means in a sequence dependent on a
similarity to the standard pattern of the feature
15 extracted by said feature extraction means.

20 14. A voice actuated dialing apparatus
comprising:

 input/output means for inputting and outputting
data;
 feature extraction means for extracting a
25 feature of an input data received through said

1 input/output means;

 storage means for storing standard patterns and
 corresponding telephone numbers of destination
 subscribers as registered data, said storage means
5 storing a plurality of telephone numbers with respect
 to predetermined ones of the subscribers;

 pattern matching means for comparing a standard
 pattern of the feature extracted by said feature
 extraction means with the standard patterns stored in
10 said storage means so as to recognize a predetermined
 one of the stored standard patterns which matches the
 standard pattern of the extracted feature;

 speech synthesis means for outputting through
 said input/output means a speech corresponding to
15 said predetermined stored standard pattern read out
 from said storage means so as to confirm a result of
 the recognition made in said pattern matching means;

 dialing means for dialing to a predetermined one
 of the telephone numbers stored in said storage part
20 and corresponding to said predetermined standard
 pattern in a voice-dialing mode; and

 control means for controlling operation
 sequences of said feature extraction means, said
 storage means, said pattern matching means, said
25 speech synthesis means and said dialing means,

1 said control means controlling said dialing
means to automatically dial another telephone number
which corresponds to said predetermined standard
pattern in a voice-dialing mode when a line of a
5 first dialed telephone number is busy and a plurality
of telephone numbers are stored with respect to said
predetermined standard pattern.

10

15. A voice actuated dialing apparatus as
claimed in claim 14 in which said control means
controls said dialing means to automatically dial
15 another telephone number which corresponds to said
predetermined standard pattern until a connection
to non-busy line is made.

20

16. A voice actuated dialing apparatus as
claimed in claim 14 in which said control means
stores in said storage means a frequency with which
25 each telephone number is used, and said control means

1 controls said dialing means to automatically dial
another telephone number which corresponds to said
predetermined standard pattern by selecting said
other telephone number in a sequence dependent on the
5 frequency of use.

10 17. A voice actuated dialing apparatus
comprising:

 input/output means for inputting and outputting
data;

15 feature extraction means for extracting a
feature of an input data received through said
input/output means;

 storage means for storing standard patterns and
corresponding telephone numbers of destination
subscribers as registered data and for storing a last
20 dialed telephone number;

 pattern matching means for comparing a standard
pattern of the feature extracted by said feature
extraction means with the standard patterns stored in
said storage means so as to recognize a predetermined
25 one of the stored standard patterns which matches the

1 standard pattern of the extracted feature;
speech synthesis means for outputting through
said input/output means a speech corresponding to
said predetermined stored standard pattern read out
5 from said storage means so as to confirm a result of
the recognition made in said pattern matching means;
dialing means for dialing to a predetermined one
of the telephone numbers stored in said storage part
and corresponding to said predetermined standard
10 pattern in a voice-dialing mode; and
control means for controlling operation
sequences of said feature extraction means, said
storage means, said pattern matching means, said
speech synthesis means and said dialing means,
15 said control means controlling said storage
means to store said last dialed telephone number in
said storage means as registered data in response to
a register instruction received from said
input/output means, said register instruction
20 accompanying a standard pattern which corresponds to
said last dialed telephone number and is entered from
said input/output means through said feature
extraction means.

1 18. A voice actuated dialing apparatus

comprising:

input/output means for inputting and outputting
data;

feature extraction means for extracting a
feature of an input data received through said
input/output means;

storage means for storing standard patterns and
corresponding telephone numbers of destination
subscribers as registered data;

pattern matching means for comparing a standard
pattern of the feature extracted by said feature
extraction means with the standard patterns stored in
said storage means so as to recognize a predetermined
one of the stored standard patterns which matches the
standard pattern of the extracted feature;

speech synthesis means for outputting through
said input/output means a speech corresponding to
said predetermined stored standard pattern read out
from said storage means so as to confirm a result of
the recognition made in said pattern matching means;

dialing means for dialing to a predetermined one
of the telephone numbers stored in said storage part
and corresponding to said predetermined standard
pattern in a voice-dialing mode;

1 area code editing means for editing an area code
of the telephone numbers stored in said storage
means; and
control means for controlling operation
5 sequences of said feature extraction means, said
storage means, said pattern matching means, said
speech synthesis means, said dialing means and said
area code editing means,
said control means controlling said area code
10 editing means to delete and/or renew at least an area
code of a specific telephone number stored in said
storage means in response to an edit instruction
received from said input/output means.

15

19. A voice actuated dialing apparatus as
claimed in claim 18 in which said control means
20 controls said area code editing means to delete the
area code from all of the stored telephone numbers
having a predetermined area code in response to an
edit instruction instructing a deletion of said
predetermined area code.

25

1 20. A voice actuated dialing apparatus as
claimed in claim 18 in which said control means
controls said area code editing means to renew the
area code of all of the stored telephone numbers
5 having a predetermined area code in response to an
edit instruction instructing a renewal of said
predetermined area code.

10

15 21. A voice actuated dialing apparatus as
claimed in claim 18 in which said control means
controls said area code editing means to add the area
code to all of the stored telephone numbers having no
area code in response to an edit instruction
instructing a renewal of the telephone numbers having
no area code.

20

22. A voice actuated dialing apparatus
comprising:
25 input/output means for inputting and outputting

1 data;

 feature extraction means for extracting a
feature of an input data received through said
input/output means;

5 storage means for storing standard patterns and
corresponding telephone numbers of destination
subscribers as registered data and for storing a last
dialed telephone number;

 pattern matching means for comparing a standard
10 pattern of the feature extracted by said feature
extraction means with the standard patterns stored in
said storage means so as to recognize a predetermined
one of the stored standard patterns which matches the
standard pattern of the extracted feature;

15 speech synthesis means for outputting through
said input/output means a speech corresponding to
said predetermined stored standard pattern read out
from said storage means so as to confirm a result of
the recognition made in said pattern matching means;

20 dialing means for dialing to a predetermined one
of the telephone numbers stored in said storage part
and corresponding to said predetermined standard
pattern in a voice-dialing mode; and

 control means for controlling operation
25 sequences of said feature extraction means, said

1 storage means, said pattern matching means, said
speech synthesis means and said dialing means,
said control means having means for detecting
whether or not said last dialed telephone number is
5 already stored in said storage means as registered
data.

10

23. A voice actuated dialing apparatus as
claimed in claim 22 in which said control means
controls said storage means to store said last dialed
telephone number in said storage means as registered
data in response to a register instruction received
from said input/output means only when said last
dialed telephone number is not stored in said storage
means as registered data as a result of the
detection, said register instruction accompanying a
15 standard pattern which corresponds to said last
dialed telephone number and is entered from said
input/output means through said feature extraction
means.

25

1 24. A voice actuated dialing apparatus as
claimed in claim 22 in which said control means has
means for outputting a guidance to said input/output
means to seek a register instruction which instructs
5 said last dialed telephone number to be registered as
registered data only when said last dialed telephone
number is not stored in said storage means as
registered data as a result of the detection.

10

25. A voice actuated dialing apparatus
15 comprising:

input/output means for inputting and outputting
data;

feature extraction means for extracting a
feature of an input data received through said
20 input/output means;

storage means for storing standard patterns and
corresponding telephone numbers of destination
subscribers as registered data and for storing
messages related to an answering phone mode;

25 pattern matching means for comparing a standard

1 pattern of the feature extracted by said feature
extraction means with the standard patterns stored in
said storage means so as to recognize a predetermined
one of the stored standard patterns which matches the
5 standard pattern of the extracted feature;

speech synthesis means for outputting through
said input/output means a speech corresponding to
said predetermined stored standard pattern read out
from said storage means so as to confirm a result of
10 the recognition made in said pattern matching means;

dialing means for dialing to a predetermined one
of the telephone numbers stored in said storage part
and corresponding to said predetermined standard
pattern in a voice-dialing mode; and

15 control means for controlling operation
sequences of said feature extraction means, said
storage means, said pattern matching means, said
speech synthesis means and said dialing means,
said control means using said storage means and
20 said speech synthesis means in common during the
voice-dialing mode and the answering phone mode.

1 26. A voice actuated dialing apparatus as
claimed in claim 25 which further comprises setting
means for setting a mode of said voice actuated
dialing apparatus to one of said voice-dialing and
5 answering phone modes.

10 27. A voice actuated dialing apparatus
comprising:

 input/output means for inputting and outputting
data;

15 feature extraction means for extracting a
feature of an input data received through said
input/output means;

 first storage means for storing standard
patterns and corresponding telephone numbers of
destination subscribers as registered data;

20 second storage means for storing messages
related to an answering phone mode;

 pattern matching means for comparing a standard
pattern of the feature extracted by said feature
extraction means with the standard patterns stored in
25 said first storage means so as to recognize a

1 predetermined one of the stored standard patterns
which matches the standard pattern of the extracted
feature;

5 speech synthesis means for outputting through
said input/output means a speech corresponding to
said predetermined stored standard pattern read out
from said first storage means so as to confirm a
result of the recognition made in said pattern
matching means;

10 dialing means for dialing to a predetermined one
of the telephone numbers stored in said first storage
part and corresponding to said predetermined standard
pattern in a voice-dialing mode; and

control means for controlling operation
15 sequences of said feature extraction means, said
first and second storage means, said pattern matching
means, said speech synthesis means and said dialing
means,

20 said control means using said speech synthesis
means in common during the voice-dialing mode and the
answering phone mode,

at least one of said first and second storage
means being detachable with respect to said voice
actuated dialing apparatus.

1 28. A voice actuated dialing apparatus as
claimed in claim 27 in which said control means
automatically sets a mode of said voice actuated
dialing apparatus to one of said voice-dialing and
5 answering phone modes depending on which one of said
first and second storage means is attached to said
voice actuated dialing apparatus.

10

29. A voice actuated dialing apparatus as
claimed in claim 27 in which both said first and
second storage means are detachable with respect to
15 said voice actuated dialing apparatus, and said voice
actuated dialing apparatus further comprises means
for identifying which one of said first and second
storage means is attached to said voice actuated
dialing apparatus, said control means automatically
20 setting a mode of said voice actuated dialing
apparatus to one of said voice-dialing and answering
phone modes depending on a result of the
identification.

25

1 30. A voice actuated dialing apparatus as
claimed in claim 27 in which only said first storage
means is detachable with respect to said voice
actuated dialing apparatus, and said voice actuated
5 dialing apparatus further comprises means for
detecting whether or not said first storage means is
attached to said voice actuated dialing apparatus,
said control means automatically setting a mode of
said voice actuated dialing apparatus to said
10 voice-dialing mode when said first storage means is
attached as a result of the detection and to said
answering phone mode when said first storage means is
not attached as a result of the detection.

15

31. A voice actuated dialing apparatus
comprising:

20 input/output means for inputting and outputting
data;
 feature extraction means for extracting a
feature of an input data received through said
input/output means;
25 storage means for storing standard patterns and

- 1 corresponding telephone numbers of destination subscribers as registered data and for storing a last dialed telephone number;
- 5 pattern matching means for comparing a standard pattern of the feature extracted by said feature extraction means with the standard patterns stored in said storage means so as to recognize a predetermined one of the stored standard patterns which matches the standard pattern of the extracted feature;
- 10 speech synthesis means for outputting through said input/output means a speech corresponding to said predetermined stored standard pattern read out from said storage means so as to confirm a result of the recognition made in said pattern matching means;
- 15 dialing means for dialing to a predetermined one of the telephone numbers stored in said storage part and corresponding to said predetermined standard pattern in a voice-dialing mode; and
- 20 control means for controlling operation sequences of said feature extraction means, said storage means, said pattern matching means, said speech synthesis means and said dialing means,
- 25 said control means controlling said dialing means to re-dial said last dialed telephone number stored in said storage means in response to a re-dial

1 instruction.

5

32. A voice actuated dialing apparatus as
claimed in claim 31 in which said storage means
restores a standard pattern of a re-dial
instruction, said pattern matching means recognizing
10 the re-dial instruction which is entered by voice
from said input/output means so that said control
means control said dialing means to re-dial said last
dialed telephone number in response to the re-dial
instruction entered by voice.

15

33. A voice actuated dialing apparatus as
20 claimed in claim 31 in which said control means
outputs said last dialed telephone number to said
input/output means so as to control said dialing
means to dial said predetermined telephone number
means to dial said predetermined telephone number
only when a confirmation is received from said
25 input/output means.

1 34. A voice actuated dialing apparatus as
claimed in claim 31 in which said control means has
means for detecting whether or not a standard pattern
of said last dialed telephone number is stored in
5 said storage means, said control means outputting the
standard pattern of said last dialed telephone number
to said input/output means so as to control said
dialing means to dial said predetermined telephone
number only when a confirmation is received from said
10 input/output means.

15 35. A voice actuated dialing apparatus as
claimed in claim 34 in which said input/output means
has a handset, a keyboard and a display part, and
said control means outputs the standard pattern of
said last dialed telephone number to at least said
20 handset.

25 36. A voice actuated dialing apparatus

1 substantially as hereinbefore described with
reference to the accompanying drawings.

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